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THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

Journal

FOUNDED, 1877.

INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,

1915.

PART I.

147482
18/11/18

REPORT OF THE COUNCIL for the Year ending 1st March, 1915.

FINANCIAL STATEMENTS FOR 1914. BUILDINGS FUND.

PROCEEDINGS OF THE COUNCIL.

ABSTRACTS OF THE REPORT OF THE BOARD OF EXAMINERS:

Intermediate and Final Examinations: January, 1915.

OBITUARY.

THE REGISTER.

NOTICES: April Examinations; Appointments Register; &c.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,

Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,

February, 1915.

Proceedings Committee, 1914-15.

E. W. VOELCKER (*Chairman*),
RAPHAEL MELDOLA (*President*),
LEONARD ARCHBUTT,
EDWARD J. BEVAN,
M. O. FORSTER,
H. R. LE SUEUR,
S. O. RICHMOND,
C. A. SEYLER,
T. STENHOUSE, jun.,
F. WALLIS STODDART.

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REPORT OF THE COUNCIL

(1914—1915).

To be submitted to the Fellows and Associates of the Institute at the Thirty-Seventh Annual General Meeting, to be held on Monday, March 1st, 1915.

1. THE ROLL OF THE INSTITUTE.

Since the publication of the Report for 1913—1914, the Council have elected 34 Fellows (of whom 29 were Associates), and 30 Associates (of whom 15 were Registered Students); 45 new Students have been admitted.

The Council record with regret the death of 9 Fellows, 1 Associate and 4 Students:—Joseph Bemrose, Harry Burrows, Ph.D., A.R.C.S., Christopher Clarke Hutchinson, K.C., John Macallan, A.R.C.S.I., Edward Riley, Sir Joseph Wilson Swan, D.Sc., M.A., F.R.S., Joseph William Thomas, William Weston, A.R.S.M., and George Henry Woollatt, Ph.D., Fellows; Fred Wright, B.Sc., Associate; and George Goss Carter, B.Sc., Harold Watson Hoyer-Millar, Robert Charles Menzies, and William Max Thiemann, Students.

The resignations of 3 Fellows and 27 Students have been accepted. The name of 1 Student has been removed from the Register for non-compliance with the Bye-Laws and Regulations.

At the date of this Report (January 29th, 1915), the Register contains the names of 1,227 Fellows and 250 Associates—an increase during the year of 24 Members. The number of Registered Students is 363, being a decrease of 2.

2. THE WORK OF THE COUNCIL.

The Council have held 12 meetings. There have been, in addition, 74 meetings of Committees, Boards, and Sub-Committees.

A Special Meeting of the Council was held to consider suggestions advanced by Mr. W. Gathorne Young with regard to giving further publicity to the aims and work of the Institute, a report of which has already appeared in the Proceedings, Part III., 1914.

Joint Meetings have been held with the Council of the Society of Public Analysts, to consider the steps to be taken to ensure a continued satisfactory supply of laboratory glass and porcelain ware, filter paper and reagents.

The following is a list of Committees and their respective Chairmen :—

COMMITTEE.				CHAIRMAN.
Finance	...	...	...	The Hon. Treasurer.
House	...	...	...	Edward John Bevan, <i>V.-P.</i>
Institutions	...	...	...	Sir Alexander Pedler, <i>C.I.E., V.-P.</i>
Library	...	...	...	The Hon. Treasurer.
Nominations and Examinations	...	...	...	The President.
Proceedings	...	...	...	Edward William Voelcker, <i>V.-P.</i>
Public Appointments	...	...	...	The President. <i>Deputy</i> : David Howard, Past President.

Special Committees.—The Special Finance Committee *re* Buildings Fund, the Buildings Committee, the Lectures Committee, the Special Committee *re* Honorary Corresponding Secretaries, and the Special Regulations Committee were reappointed, of all of which the President was Chairman. A Glass Research Committee was also appointed.

Sub-Committees were likewise appointed to deal with details of the work of the Buildings Committee and of the Special Regulations Committee.

3. PROFESSIONAL CHEMISTRY AND THE WAR.

A statement on the action taken by the Council in connection with the outbreak of war has already appeared in Proceedings, Part IV., 1914. In the same issue, the full text was given of a memorandum on the origin and conduct of the war, subscribed to by a large number of British representatives of literature, art, and science, and it was reported that the President and Council of the Institute desired to associate

themselves with the statement and expressions of opinion advanced therein.

Immediately on the declaration of hostilities, the Secretary of State for War was informed that Fellows and Associates of the Institute having special knowledge in connection with the manufacture and examination of explosives, and other war material, as well as with the examination of food, drugs and water, were available for scientific work on behalf of the country. A number of Fellows and Associates have been accepted for scientific service, and in other ways the Institute and its Members have been useful to the Government. Many members and students have volunteered for active service.

It has been recorded in the Proceedings that, after consultation with a number of prominent chemists, including the Presidents of the Institute and the Society of Public Analysts, it was suggested that the Board of Trade should appoint a Committee representing manufacturing and consulting technological chemistry to consider and report what steps should be taken to supply the demand for certain chemical products hitherto obtained from abroad. The Board have duly appointed a Committee under the Chairmanship of the Lord High Chancellor "to consider and advise as to the best means of obtaining for the use of British industry sufficient supplies of chemical products, colours and dyestuffs of kinds hitherto largely imported from countries with which we are at present at war." The work of this Committee is proceeding.

The Council have also reported on the steps taken in conjunction with the Society of Public Analysts to ensure a continued supply of chemical glass and porcelain apparatus, filter paper and analytical reagents, in connection with which a fuller report will be published shortly.

4. GLASS RESEARCH COMMITTEE.

The Council have appointed an Advisory Committee to conduct research on glass, the work to be carried out in the

laboratories of the Institute, with a view to arriving at suitable formulas to be freely available to manufacturers willing to assist in maintaining the supply of glass apparatus.

The Committee is empowered to expend a sum not exceeding £200 on these investigations, a report on which will be published in due course. In the meantime, the Council report that formulas for the manufacture of types of laboratory glassware have already been supplied to a number of manufacturers interested in the matter.

5. THE FINANCE COMMITTEE AND SPECIAL FINANCE COMMITTEE.

General Account.—The Financial Statement for 1914 shows a decided decrease (£483) in the receipts for examination fees, mainly attributable to the fact that a large number of Students have joined the forces. Entrance fees and life compositions received were also appreciably less than in 1913. However, the redemption policies taken out, in 1893, to cover the cost of the lease of 30, Bloomsbury Square, and of the erection of laboratories, were realised during the year and thus the Institute was enabled to meet the diminution in income.

The expenditure on printing shows an increase due to the publication of the History of the Institute, the cost of which was £199. 7s. The item for rates and taxes was lower for the reason that the rates for the Bloomsbury Square premises were paid only to December 25th, 1914, and not for the Quarter ending Lady Day, 1915. The amount for salaries and wages was increased by the allowance made to the Registrar in lieu of residential quarters and by an addition to the office staff. The expenditure on apparatus and materials was also greater in view of purchases made in anticipation of the equipment of the new laboratories. Of the amount derived from the redemption policies (£3,755), a sum of £200 is yet to be invested to maintain this reserve intact, while a sum of £149. os. 3d., (of which £34. 11s. 3d. belongs to 1913), representing life compositions and fees reserved for investment, will be placed to the Reserve Account when funds allow.

Buildings Fund.—The Accounts for the Buildings Fund show that the contributions received in 1914 amounted to £3,669. 3s. 10d., and that a sum of £259. 13s. 4d. was derived from dividends and interest. The Institute was fortunate in receiving the main part of the contributions previous to the outbreak of war, as it would have been increasingly difficult to make further progress, in view of the many other appeals which have since been made. Investments to the amount of £3,555 were realised by transference of Stock to the Institute's General Reserve, thus obviating the necessity of selling it at an unfavourable time and saving the expense of brokerage on both accounts. The certificates for payments to the contractors, etc., have been promptly met, and it is hoped that when the building is completed and equipped to the extent at present contemplated, all expenses will have been met by the funds raised, without having to draw more than £1,000 from the Reserve Funds of the Institute. The Council, it will be remembered, were empowered by an Extraordinary General Meeting held on June 18th, 1913, to utilise, if necessary, as much as £3,500 of the Reserve Funds. The Council have deemed it justifiable to authorise additional expenditure on the provision of a lift and on other improvements, seeing that the Institute will receive in the future a legacy of £1,000 under the will of the late Mr. Edward Riley.

6. HOUSE.

The house and laboratories at 30, Bloomsbury Square have been maintained in sufficiently satisfactory repair. The benches in the laboratory were dismantled in order that the drawers and other parts could be used in the equipment of the new laboratories, the wood being in good condition and well seasoned.

The new building is approaching completion: it is hoped that the Institute will be in occupation in February, and that the work of equipment may be finished in the near future.

The House Committee, in consultation with the Finance Committee, have prepared a schedule of furniture required for 30, Russell Square, but the actual outlay has been postponed.

7. INSTITUTIONS COMMITTEE.

On a report from the Institutions Committee, the Council have granted formal recognition to the East London College, subject to the usual conditions, and have under consideration the cases of several other Institutions in London and in the provinces with a view to their addition to the list of those recognised for the training of Candidates for the examinations of the Institute.

8. LECTURES COMMITTEE.

Two lectures on "Explosives" were delivered, during the Session, by Mr. William Macnab, the first on February 26th, when the chair was occupied by the President, and the second on March 26th, when Professor Herbert Jackson presided.

Both were delivered at King's College. The thanks of the Council have been accorded to the Delegacy of the College for the use of the Lecture Theatre on these occasions.

In consequence of the war, the Lectures Committee deemed it inadvisable to carry out their complete programme for the present session.

9. THE LIBRARY.

The Library Committee had at their disposal during the year the sum of £24. 19s. 3d., which was expended mainly in subscriptions to journals and in binding. The account at the close of the year showed a deficit of £7. 12s.

The card catalogues have been brought up to date by Mr. F. W. Clifford, Librarian to the Chemical Society, by whom the collection will be arranged in the new building.

The Council record their thanks to all who presented volumes and pamphlets during the year. The list of additions to the Library and the list of journals received will be published in Proceedings, Part II.

10. EXAMINATIONS.

The Board of Examiners for the past year consisted of :—
Chairman: Raphael Meldola, D.Sc. (Oxon.), LL.D. (St. Andrews),
V.-P.R.S., *President*.

For the Intermediate Examinations :

Alfred Chaston Chapman, F.I.C.; Arthur William Crossley, D.Sc., Ph.D.,
F.R.S

For the Final Examination :

Mineral Chemistry...	...	Herbert Jackson, F.I.C.
Metallurgical Chemistry	...	George Thomas Holloway, A.R.C.S., F.I.C.
Physical Chemistry	...	Alexander Findlay, M.A., D.Sc., Ph.D., F.I.C.
Organic Chemistry	...	William Jackson Pope, M.A., F.R.S., F.I.C., and (during Professor Pope's absence) Arthur William Crossley, D.Sc., Ph.D., F.R.S.
The Chemistry and Micro- scopy of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water...		Percy Andrew Ellis Richards, F.I.C.
Therapeutics, Pharmacology and Microscopy.		Frederick Gowland Hopkins, D.Sc., M.B., F.R.S.
Biological Chemistry, Bac- teriology, Fermentation, and Enzyme Action	...	Alfred Chaston Chapman, F.I.C.

The places and dates of the Examinations were as follows :—

Intermediate Examination :—At the Institute, March and July, 1914 ; at the Royal Technical College, Glasgow, July, 1914 ; and at the Laboratories of the Pharmaceutical Society, January, 1915.

Final Examination :—

Mineral Chemistry :—At the Institute, March and July, 1914 ; at the Royal College of Science for Ireland, Dublin, July, 1914 ; and at the Laboratories of the Pharmaceutical Society, January, 1915.

Metallurgical Chemistry :—At the Royal Technical College, Glasgow, July, 1914.

Organic Chemistry :—At the Institute, March and July, 1914 ; at the Government Laboratories, Johannesburg, June, 1914 ; at the Royal Technical College, Glasgow, July, 1914 ; and at the Laboratories of the Pharmaceutical Society, January, 1915.

Chemistry of Food and Drugs, etc. :—At the Institute, March and July, 1914 ; at the Government Laboratory, Hongkong, November, 1914 ; and at the Laboratories of the Pharmaceutical Society, January, 1915.

Biological Chemistry :—At the Laboratory of Mr. A. Chaston Chapman, October, 1914.

A Candidate who had been examined in Metallurgical Chemistry, in London, in April, 1913, completed his examination in general theoretical chemistry at Johannesburg, in April, 1914.

The Examinations at Glasgow were held under the supervision of Professor G. G. Henderson, Professor Alexander Findlay, and Professor Alfred Campion; that at Dublin, under the supervision of Professor Sydney Young; that at Hongkong, under the supervision of Mr. Frank Browne; and those at Johannesburg, under the supervision of Dr. McCrae and Mr. J. T. Martyn, respectively. The following have assisted the Board during the year:—Mr. L. E. Hinkel and Mr. W. R. Pratt at the Examinations held in London; Dr. I. M. Heilbron and Miss M. M. J. Sutherland, D.Sc., at the Examinations at Glasgow, and Mr. H. W. Moss at the Examination at Dublin. Mr. John Webster assisted at the Examinations in Therapeutics, Pharmacology and Microscopy.

The thanks of the Council have been accorded to the Governors of the Royal Technical College, Glasgow; to the Department of Agriculture and Technical Instruction for Ireland; to the Council of the Pharmaceutical Society, and to the Government Authorities at Johannesburg and Hongkong, for the use of laboratories.

The results are summarised in the following table:—

				EXAMINED.	PASSED.
Intermediate Examination	...	...	...	37	22
Final (A.I.C.) Examination:—					
Branch (a) Mineral Chemistry	...	...	...	7	4
Branch (b) Metallurgical Chemistry	...	...	...	3	0
Branch (d) Organic Chemistry	...	...	...	26	13
Branch (e) Chemistry of Food and Drugs, etc.	...	...	...	18	8
Branch (f) Biological Chemistry	...	...	...	1	1
				<u>92</u>	<u>48</u>

The number of entries was the lowest recorded since 1902. Those for July were lower than usual, but the main decrease occurred in the entries for January, 1915. The percentage of passes was 52, compared with 53 in the previous year.

The following Examiners retire on completing their term of office on March 1st, 1915:—

Mr. A. Chaston Chapman (Intermediate Examination and General Chemistry).

Professor Herbert Jackson (Mineral Chemistry).

Mr. George T. Holloway (Metallurgical Chemistry).

Dr. Alexander Findlay (Physical Chemistry).

Mr. P. A. Ellis Richards (Chemistry and Microscopy of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water).

II. REGULATIONS.

The Special Regulations Committee appointed to consider the suggestions made at the Conference of Professors of Chemistry held in October, 1913, appointed Sub-Committees (i) to consider the desirability of revising the syllabuses of the Intermediate and Final Examinations of the Institute, (ii) to consider what further Institutions, if any, should be recognised for the training of Candidates for the Examinations of the Institute, and (iii) to consider what steps should be taken to reduce the number of Examinations to be passed by Candidates for the Associateship of the Institute. A scheme was formulated and was approved by the Council provisionally, pending negotiations between the Institute and the authorities of the Universities, under which it was proposed that the Institute should send assessors to the Final Honours Degree Examinations (following on a *four years'* course), in order that Candidates who desired to obtain the Associateship of the Institute might be assessed at the same time, and, if found eligible, exempted from any further separate Examination for the Associateship.

In view of this scheme, it was held that it would be inconsistent to continue the Intermediate and Final Examinations for the Associateship as at present conducted, and the Council have approved in principle a new scheme which will be submitted to the Fellows and Associates for discussion at a Special Meeting to be arranged in the near future, subject to the advice of the solicitors and, if necessary, the consent of the Privy Council.

Under the new scheme it is proposed to substitute for the present Regulations (a) to (c) on p. 12, those indicated on p. 13: (A) to (E).

PRESENT REGULATIONS.

(a) An approved Preliminary Examination.

(b) Three years training at a recognised University or College ;

or, two years such training and two years under a Fellow of the Institute in a laboratory approved by the Council ;

or, a pass degree B.A. or B.Sc. in Chemistry and Physics.

(c) The Intermediate Examination ;

or, first or second class Honours in Chemistry in a recognised B.Sc. examination.

(d) Final Examination for the Associateship.

(e) Three years experience (to the satisfaction of the Council) prior to election to the Fellowship.

PROPOSED REGULATIONS.

(A) An approved Preliminary Examination.

(B) and (C) Four years training in a recognised University or College ;

or, three years such training, and two other years under a Fellow in a laboratory approved by the Council, or other approved experience ;

or, a pass degree (B.A. or B.Sc.) in Chemistry and Physics and two years subsequent experience or training approved by the Council ;

or (if the Candidate be not assessed for A.I.C. as provided in (D) below) a degree with first or second class honours in Chemistry, obtained after a three years course, and such additional experience or training in Chemistry as the Council may require in each case.

(D) An Examination in *general* theoretical and practical chemistry for the Associateship conducted by the Institute ;

or, an examination under the scheme for assessing candidates at the Examination for B.Sc. honours degree (following on a four years course) at a recognised University ;

or, an examination under the scheme for assessing candidates for other degrees or diplomas (following on a four years' course) approved by the Council.

(E) Three years experience (to the satisfaction of the Council) after admission to the Associateship, followed by an Examination for the Fellowship in a special branch, similar to the Final Examination at present held, but specially conducted for the purpose of ascertaining the fitness of the Candidate to cope with any problem likely to occur in the department of practice corresponding with the branch selected. The Candidate will be required to show a good general knowledge of chemical technology and a special knowledge of at least one branch of chemical industry ;

or, after three years experience as above, election to the Fellowship may be granted to a Candidate who produces records of original research of sufficient merit in the opinion of the Council, or devises processes or inventions of sufficient merit in the opinion of the Council, or produces evidence of knowledge and ability which in the opinion of the Council is equivalent to fulfilling the conditions hereinbefore contained.

It is not intended that the proposed alterations in the Regulations shall in any way affect the powers of the Council to elect Fellows, in exceptional cases, under Clause 5 of the Charter of the Institute; nor that they should affect the interests of existing Registered Students, who shall have the option of proceeding to the Associateship and Fellowship by either the present or the new method; nor the interests of existing Associates, who shall be entitled to apply for the Fellowship under the Regulations now in force.

12. PUBLIC APPOINTMENTS COMMITTEE.

Early in the year, the Public Appointments Committee held meetings jointly with representatives of the Society of Public Analysts to consider the steps to be taken to bring the views, formulated by the Councils of the Institute and of the Society, to the notice of the Local Government Boards and the Board of Agriculture. These views had already been published in a statement on "The Conditions of Appointments of Public Analysts" which appeared in the Proceedings of the Institute, Part IV., 1913, and were subsequently issued to county and municipal authorities in Great Britain and Ireland. A Sub-Committee was appointed to deal with this matter, and also to consider the new Sale of Food and Drugs Bill then under consideration in Parliament. The Bill, however, was not proceeded with, and, owing to questions of greater urgency arising, further action was postponed.

The memorandum forwarded by the Council to the Royal Commission on the Public Services in India was supplemented by evidence given by Sir Alexander Pedler, Vice-President, at a meeting of the Commissioners held on May 8th. The Commission intimated that having already taken first-hand evidence on questions of pay, allowances, leave and pension, at their sittings in India, they were not required to deal with questions affecting chemists attached to the Ordnance Department. Scarcely any evidence was taken, therefore, on the views of the Council as expressed in the memorandum. Sir Alexander, however, emphasised the view that chemical

appointments such as those of Chemical Examiners to Government and Assay Masters to the Mints should be filled by professional chemists, and not necessarily by military officers or medical men. He made it clear also that the Institute would endeavour to hold Examinations in India for any Candidates who had complied with the Regulations as to training. The Commissioners undertook to give careful consideration to the views of the Council of the Institute.

13. ENGINEERING STANDARDS COMMITTEE.

In 1910, in response to a request from the Engineering Standards Committee, the Council appointed Mr. William Thomason to represent the Institute on a Sub-Committee for the Standardisation of Vitriified Stoneware Pipes. The Sub-Committee concluded their meetings in June last, agreement having been reached upon all necessary points. The thanks of the Council have been accorded to Mr. Thomason for his services.

14. APPOINTMENTS REGISTER.

The Appointments Register has proved to be of increasing value to Fellows and Associates in securing appointments, especially during the last few months, partly owing to vacancies occurring through Members joining the Forces, and also on account of the demand for chemists required in recent developments in industry.

15. HONORARY CORRESPONDING SECRETARIES.

The Council record their thanks to the following Members who have held office as Honorary Corresponding Secretaries :—

THE COMMONWEALTH OF AUSTRALIA :—

New South Wales	...	...	W. M. Hamlet.
Queensland	...	...	J. Brownlie Henderson.
South Australia	...	...	E. H. Rennie, D.Sc.
Victoria	...	...	A. E. Leighton.

THE DOMINION OF CANADA :—

Nova Scotia	W. C. Carter.
Ontario	F. T. Shutt, M.A., D.Sc.; W. R. Lang, D.Sc.

Quebec	F. M. G. Johnson, Ph.D., M.Sc.
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EGYPT Alfred Lucas.

THE EMPIRE OF INDIA :—

Bengal... ..	J. Walter Leather.
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Madras	J. C. Burnham, C.S.I., B.Sc.
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THE DOMINION OF NEW ZEALAND T. H. Easterfield, M.A., Ph.D.

THE STRAITS SETTLEMENTS AND THE FAR EAST :—

Frankland Dent, Ph.D., M.Sc.

THE UNION OF SOUTH AFRICA :—

Cape Colony	C. F. Juritz, M.A., D.Sc.
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Transvaal	John McCrae, Ph.D.
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Natal	J. S. Jamieson.
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THE WEST INDIES :—

Barbados	J. P. d'Albuquerque, M.A.; Francis Watts, C.M.G., D.Sc.
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British Guiana	J. B. Harrison, C.M.G., M.A.
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16. PUBLICATIONS, 1914—15.

The Proceedings for 1914 were published in four parts : Part I., issued in February, contained the Report of the Council and Financial Statements for 1913, with abstracts of the reports on the examinations held in October, 1913, and January, 1914 ; Part II., issued in April, included the Report of the Annual General Meeting and the President's Address ; Part III., issued in July, included an abstract of the report on the April Examinations, and a report on the evidence given before the Royal Commission on the Public Services in India, and of a Special Meeting of the Council ; and Part IV., issued in November, contained an account of matters, affecting the interests of professional chemists, which had arisen on account of the war, and abstracts of the reports on the July and October Examinations. Each part dealt with the progress of the new building and the Building Fund.

Mr. Macnab's lectures were published in April, and the Register of Fellows, Associates and Students in August, 1914.

The History of the Institute : 1877—1914, was also published and issued in July, 1914.

The Examination Papers for 1914 were published in January, 1915.

THE RETIRING PRESIDENT.

On the occasion of the retirement of Professor Raphael Meldola from the office of President, the Council desire to express their great appreciation of his eminent services to the Institute during the past three years.

They feel that the Institute has been especially fortunate in having had his guidance during one of the most important and critical periods of its existence. They record their high sense of the valuable influence of his unfailing energy, tact, and wise counsels, and they desire to assure him that, in their opinion, he has insured to the Institute a future of greater promise and increased public usefulness.

January 29th, 1915.

REPORT OF THE AUDITORS.

Having examined the Books and Vouchers, and verified the investments in Consols, in Metropolitan 3 per cent. Stock, and in New Zealand 4 per cent. Inscribed Stock, standing to the credit of the Institute in the Books of the Bank of England, and the investment in Victoria 4 per cent. Inscribed Stock, standing to the credit of the Institute in the Books of the London County and Westminster Bank, Limited; also having examined the certificates of Great Western Railway Debenture Stock, Midland Railway 2½ per cent. Preference Stock, and Canada 3½ per cent. Registered Stock, and the Deposit Receipts of Buildings Fund Account, we certify that the following statements are correct.

The balance of £5,250 on deposit account includes £2,000 which the Bank was instructed to transfer from the Institute's General Funds Deposit Account to the Buildings Fund Deposit Account at the close of the year. The transfer was not actually made, however, till the 1st January, 1915.

W. J. ATKINSON BUTTERFIELD,	} <i>Hon.</i> <i>Auditors.</i> 1914-15.
PERCY E. SPIELMANN,	
HERBERT F. STEPHENSON,	

INSTITUTE OF CHEMISTRY BUILDINGS FUND.

STATEMENT OF RECEIPTS AND EXPENDITURE SINCE THE OPENING OF BUILDINGS FUND A/c, 1909—1914.

RECEIPTS.			EXPENDITURE.		
	£	s. d.		£	s. d.
Contributions ... ..	...	15,383 9 0	Site and Building Costs to date :		
Dividends and Interest ... ..	...	1,110 9 0	Bedford Estate	798 3 9	
Realisation of Investments ... ..	...	3,731 9 9	Contractors	7,891 0 0	
			Architect, and Surveyor	425 0 0	
			Electrical Engineer	26 5 0	
			Legal Expenses	32 10 0	
			Insurance	35 0 4	
			Clerk of Works	270 5 6	
			Miscellaneous Expenses		
			(Printing, Postage, etc.)	259 2 8	9,737 7 3
			Investments at cost, including		
			Commission		4,806 11 0
			Balance at Bank, Dec. 31st, 1914—		
			Current A/c	431 9 6	
			Deposit A/c	5,250 0 0	
				5,681 9 6	
				£20,225 7 9	
ASSETS.			LIABILITIES.		
	£	s. d.		£	s. d.
Balance at Bank ... ..	...	5,681 9 6	General Fund : Postage ... ..	...	5 0 9
£1,398 Midland Railway 2½ per cent. Perpetual Preference Stock, 31st Dec. 1914	838 16 0		Dividends ... ..	...	4 16 5

* See note on page 18.

THE INSTITUTE OF CHEMISTRY

Founded. 1877.

STATEMENT OF RECEIPTS AND EXPENDITURE

		GENERAL	
1913.	RECEIPTS.	£ s. d.	£ s. d.
	Balance at Bank on the 31st Dec., 1913—		
£147 17 11	General A/c	266 6 9	
14 4 10	Biological Chemistry A/c ...	14 4 10	
6 8 5	Library A/c		280 11 7
	Subscriptions—		
1,027 19 0	Fellows'	1,043 13 3	
290 17 0	Associates'	267 10 0	
88 5 0	Students'	81 15 0	1,392 18 3
283 10 0	Entrance Fees		210 0 0
115 13 8	Dividends... ..	117 3 4	
9 10 11	Interest on Deposit A/c... ..	45 17 6	163 0 10
	Sundry Receipts—		
33 8 8	Sale of Lectures, etc. ...	28 16 1	
6 10 7	Use of Laboratories, etc. ...	2 17 0	
	Miscellaneous	0 6 7	31 19 8
1,125 12 0	Examination Fees		642 12 0
15 10 0	Appointments Register		15 12 6
3,165 8 0	Life Compositions and Fees reserved for Investment: ...		2,736 14 10
211 1 0	Buildings Fund : Postage (1913)		114 9 0
26 1 0	Fees in abeyance (1913) ...		7 14 11
22 1 0	Redemption Policies' Proceeds...		3,755 0 0
<u>£3,424 11 0</u>			<u>£6,613 18 9</u>

OF GREAT BRITAIN AND IRELAND.

Incorporated by Royal Charter, 1885.

FOR THE YEAR ENDED DECEMBER 31st, 1914.

ACCOUNT.

1913.	EXPENDITURE.	£	s.	d.	£	s.	d.
£359 0 1	Printing, Stationery, Office Books, &c.	...	503	8	9		
188 4 7	Postage ... ..	...	190	7	1		
115 1 0	Rent ... ..	...	115	1	0		
125 10 8	Rates and Taxes...	...	107	4	0		
138 15 4	Redemption Premiums (1913).						
14 4 6	Insurance...	...	12	19	0		
42 2 3	Repairs, House and Furnishing	...	26	18	6		
701 14 11	Salaries and Wages ... ..	...	812	4	4		
63 12 3	Advertisements ... ..	...	83	19	2		
58 3 1	Gas, Water, Electric Light and Power	...	51	7	5		
20 2 3	Telephone ... ..	...	18	11	6		
	Examiners and Assistants (Fees and Expenses) ... ..	...	598	8	10		
737 3 0	Apparatus and Materials ... ..	...	105	12	9		
84 8 6	Sundry Examination Expenses ... ..	...	8	8	5		
11 6 4	Glass Research Account ... ..	...	16	11	3		
151 10 11	Lectures (including Printing, Postage, etc.)...	...	117	14	0		
31 9 2	Library Account (<i>see over</i>) ... ..	...	32	11	3		
65 12 11	Miscellaneous and Household...	...	31	19	2		
2,908 1 9			2,833	6	5		
7 14 11	Buildings Fund (Postage) ... ..	...	5	0	9		
	Legal Expenses ... ..	...	26	10	9		
176 9 9	Investments ... ..	...	3,555	0	0		
51 13 0	Conference (1913).						
	Balance at Bank, 31st Dec., 1914—						
266 6 9	General A/c... ..	179	16	0			
14 4 10	Biological Chemistry A/c... ..	14	4	10			
	Library A/c						
			194	0	10		
£3,424 11 0			£6,613	18	9		

GENERAL STATEMENT OF ASSETS AND

1913.	ASSETS.	£	s.	d.
£280 11 7	Balance at Bank...	194	0	10
248 19 6	Approximate Value of Furniture ...	228	14	7
	Approximate Value of Apparatus and			
283 17 1	Materials ...	275	6	1
463 13 11	Approximate Value of Library...	449	17	10
3,056 11 0	£3,000 Victoria 4 per cent. Inscribed			
(Cost.)	Stock, 31st Dec., 1914 ...	3,000	0	0
	£2,000 2½ per cent. Consols, 31st Dec.,			
1,435 0 0	1914 ...	1,380	0	0
1,026 4 2	£1,000 New Zealand 4 per cent. In-			
(Cost.)	scribed Stock, 31st Dec., 1914 ...	980	0	0
	£700 Canada 3½ per cent. Registered			
623 0 0	Stock, 1930-1950, 31st Dec., 1914 ...	609	0	0
	£500 Metropolitan 3 per cent. Stock,			
415 0 0	31st Dec., 1914 ...	426	5	0
	£500 Great Western Railway 2½ per cent.			
317 10 0	Debenture Stock, 31st Dec., 1914 ...	312	10	0
	£435 Midland Railway 2½ per cent. Per-			
262 3 11	petual Preference Stock, 31st Dec., 1914 ...	261	0	0
7 14 11	Buildings Fund (Postage 1914) ...	5	0	9
	(Dividends 1914) ...	4	16	5

LIBRARY FUND ACCOUNT for RECEIPTS.

	£	s.	d.
£6 8 5	Balance ...		
25 0 0	Grant from General Account ...	25	0 0
0 0 9	Deficit : 31st Dec., 1914 ...	7	12 0
£31 9 2		£32	12 0

BUILDINGS FUND ACCOUNT for RECEIPTS.

	£	s.	d.	£	s.	d.
	Balance at Bank, Dec. 31st, 1913:—					
£379 12 5	Current A/c ...	65	14 4			
3,300 0 0	Deposit A/c ...	4,800	0 0			
				4,865	14	4
3,576 1 0	Contributions ...			3,669	3	10
373 2 0	Interest and Dividends ...			259	13	4
176 9 9	Realisation of Investments ...			3,555	0	0
£7,805 5 2				£12,349	11	6

ASSETS.

	£	s.	d.
	Balance at Bank, 31st Dec., 1914:—		
£65 14 4	Current A/c ...	431	9 6
£1,800 0 0	Deposit A/c* ...	5,250	0 0
		5,681	9 6
	£1,398 Midland Railway 2½ per cent.		
846 19 4	Perpetual Preference Stock, 31st Dec., 1914	838	16 0

* See note on p. 18.

ACCOUNT.

LIABILITIES, Dec. 31st, 1914.

1913.	LIABILITIES.	£	s.	d.	£	s.	d.
	Subscriptions received in advance—						
£19 19 0	Fellows'	18	18	0			
5 5 0	Associates'	3	3	0			
1 5 0	Students'	1	5	0			
						23	6 0
	Fees for the January (1915)						
	Examination received in advance				141	15	0
274 1 0	Balance on Biological Examination A/c				14	4	10
14 4 10							

the Year ended Dec. 31st, 1914.

	EXPENDITURE.	£	s.	d.
£31 9 2	Deficit : 31st Dec., 1913	0	0	9
	Books, Journals, Binding, &c.	32	11	3
£31 9 2				
	LIABILITIES.	£	s.	d.
	Deficit	£7	12	0
		£32	12	0

the Year ended Dec. 31st, 1914.

	EXPENDITURE.	£	s.	d.	£	s.	d.
	Site and Buildings Costs to date:—						
£798 3 9	Bedford Estate						
2,000 0 0	Contractors	5,891	0	0			
	Architect and Surveyors	425	0	0			
	Electrical Engineer	26	5	0			
	Legal Expenses	32	10	0			
45 6 6	Clerk of Works	224	18	0			
	Insurance	35	0	4			
96 0 7	Miscellaneous Expenses	33	8	8			
					6,668	2	0
	Balance at Bank, 31st Dec., 1914:—						
65 14 4	Current A/c	431	9	6			
4,800 0 0	Deposit A/c*	5,250	0	0			
					5,681	9	6
£7,805 5 2					£12,349	11	6

* See note on p. 18.

	LIABILITIES.	£	s.	d.
£7 14 11	Postage due to General A/c	5	0	9
	Dividends due to General A/c	4	16	5

Proceedings of the Council.

NOVEMBER, 1914—JANUARY, 1915.

Examinations.—The Council have received the Reports of the Board of Examiners on the Intermediate and Final Examinations held in January, 1915. The Council have also received the Report on an Examination in the Chemistry of Food and Drugs, etc., held at Hongkong in November, 1914.

Glass Research.—The Glass Research Committee, whose appointment was announced in Proceedings, Part IV., 1914, presented their first report on November 30th, embodying the results of experiments made by Professor Herbert Jackson and Mr. T. R. Merton, and giving the formula for an alumina-soda glass suitable for the manufacture of chemical laboratory ware. Copies of this formula were sent to firms likely to be interested in the industry. It was stated subsequently that the formula was similar to one used by several makers who had been conducting experiments with the same object in view.

Mr. Hehner having analysed several varieties of glass, Professor Jackson and Mr. Merton conducted further experiments and reported to the Committee, giving a formula for a glass which, in their opinion, is a satisfactory substitute for Jena glass in respect of its resistance to water and reagents. This formula was also sent to manufacturers.

Melts were made in accordance with both formulas, and the Committee were fortunate in securing the assistance of Messrs. Kempton, of Vauxhall Walk, who kindly attended at the Institute to conduct blowing experiments on the small scale. They considered the glass to be suitable for blowing and manipulation.

In December, the Committee were informed by the Home Office that it would be desirable to obtain a suitable formula for the manufacture of miners' lamp glasses. The Committee

were provided, by a manufacturing firm and by the Home Office, with specimens of approved glasses, analyses of one of which were undertaken by Mr. Bertram Blount, Mr. Otto Hehner and Mr. Walter C. Hancock. It was found, however, that attempts to prepare experimental melts corresponding with the data obtained were not successful; but the analyses were very helpful in the synthetical experiments carried out by Professor Jackson and Mr. Merton, who have been able to prepare a very promising glass for miners' lamps, and have communicated the formula for making it. It has been arranged that melts on a fairly large scale will be made in the near future at Messrs. Kempton's works, the Institute agreeing to contribute to the expense involved.

Laboratory Supplies.—Information has been received that the British Laboratory Ware Association have negotiated with a number of glass works undertaking to supply British-made laboratory glassware, made to formulas supplied by Mr. F. W. Branson, and said to be similar to the first formula issued by the Institute's Glass Research Committee. Samples of beakers have been examined by the Institute's Committee, and they are reported to be suitable for ordinary operations.

The British Laboratory Ware Association consists of the following firms:—

BAIRD, A. H., 33, Lothian Street, Edinburgh.
 BAIRD & TATLOCK, 45, Renfrew Street, Glasgow.
 BECKER, F. E., & Co. (W. & J. GEORGE, LTD.), London.
 BRADY & MARTIN, LTD., Newcastle-upon-Tyne.
 FERRIS & Co., LTD., Union Street, Bristol.
 GALLENKAMP, A., & Co., LTD., London.
 GEORGE, W. & J., LTD., 157, Charles Street, Birmingham.
 GRIFFIN, J. J., & SONS, LTD., Kingsway, London.
 HARRIS, PHILIP, & Co., LTD., 144-146, Edmund Street, Birmingham.
 HARRISON, PARKINSON & Co., Sun Bridge Road, Bradford.
 JACKSON, FRED, & Co., LTD., Salford, Manchester.
 PRESTON, J., 105, Parker's Pool, Sheffield.
 REYNOLDS & BRANSON, LTD., 14, Commercial Street, Leeds.
 SOUTHALL BROS. & BARCLAY, LTD., Birmingham.
 STANDLEY, BELCHER & MASON, LTD., Birmingham.
 TOWERS, J. W. & Co., LTD., Victoria House, Widnes.
 TOWNSON & MERCER, LTD., 34, Camomile Street, London.
 WOOLLEY, SONS & Co., LTD., Victoria Bridge, Manchester.

Messrs. Baird & Tatlock (London), Ltd., have erected a factory at Walthamstow for the production of chemical laboratory ware, and expect to be able soon to produce vessels of their own manufacture.

Samples of beakers and flasks have been received from Messrs. Jules Lang & Son, whose factory is at Eu, near Dieppe, and samples of tubing, capillary tubing and flasks, from an alumina-soda glass, have been received from Messrs. James Powell & Sons, of Whitefriars Glassworks, Tudor Street, London, E.C., but this latter glass has been made principally with a view to use in X-ray work. These samples, however, have been examined by members of the Glass Research Committee and are reported to be similar to ordinary laboratory glass in their behaviour with water, acids and alkalis.

Samples of porcelain basins and crucibles, etc., of Royal Doulton ware have been received and have been found quite satisfactory. These are supplied at approximately the same cost as the Royal Berlin ware.

The Worcester Royal Porcelain Co., Ltd., have also reported that they are making ware for laboratory purposes.

Samples of Whatman Filter Paper have been received from Messrs. W. & R. Balston, and are reported on as very satisfactory in respect of retaining fine precipitates.

Samples so far examined indicate that acid treatment will result in the production of paper at least equal to the best foreign makes as regards the amount of ash and filtering properties.

The name of Messrs. Evans, Adlard & Co., of Postlip Mills, Winchcombe R.S.O., Gloucestershire, should be added to the list of makers given in Proceedings, Part IV.

In the same list, Messrs. William Howard and Son, Ltd., of Chartham, Canterbury, were wrongly described as Messrs. Heard.

The Special Committee appointed by the Councils of the Institute and the Society of Public Analysts to enquire into the question of maintaining a satisfactory supply of laboratory reagents, appointed a Sub-Committee to prepare a list of

reagents for analytical purposes, with notes indicating the standards of purity regarded as necessary for analytical work. The Sub-Committee consisted of Professor R. Meldola (President of the Institute), Mr. A. Chaston Chapman (President of the Society), Professor A. W. Crossley, Dr. Bernard Dyer and Dr. M. O. Forster.

The Sub-Committee prepared a list, as suggested, which was subsequently adopted by the Special Committee. Proofs of the list have been sent to a number of firms, who were asked to state what substances of their own manufacture they were prepared to supply according to the standards specified. The enquiry is still proceeding.

It is not anticipated that there will be any great difficulty in securing supplies of any ordinary reagents, but, should it be found that there are reagents included in the list which are not made in Great Britain and Ireland, it is proposed to ascertain whether any firms in this country will be prepared to undertake the manufacture of them. The Chemical Sub-Committee (Professor Crossley, Hon. Secretary) of the Royal Society War Committee will also be informed if difficulty is experienced in obtaining any such materials, so that a special endeavour may be made to manufacture them in this country; or if there be any then unobtainable, firms in neutral countries will be asked whether they will be prepared to supply them.

The Committee are of opinion that manufacturers should use some distinctive label on reagents for analytical purposes, such as the words "Analytical Reagent." They are of opinion that purchasers should demand their supplies with the *manufacturers'* label on the bottle or package as sold.

It is understood that the Institute of Chemistry and the Society of Public Analysts will make known the names of manufacturers who are producing reagents answering to the standards scheduled, and will take steps to encourage users to specify British products.

Examiners. — The thanks of the Council have been accorded to the following Examiners, whose term of office

will expire on March 1st: Mr. A. Chaston Chapman (Intermediate Examination and General Chemistry), Professor Herbert Jackson (Mineral Chemistry), Mr. George T. Holloway (Metallurgical Chemistry), Dr. Alexander Findlay (Physical Chemistry), and Mr. P. A. Ellis Richards (Chemistry of Food and Drugs, etc.). The Council will appoint their successors at the meeting to be held on February 26th.

Officers and Members of Council.—The Officers and Members of Council who retire at the Annual General Meeting on March 1st, 1915, under the provisions of Bye-law 30, are as follows:—*President*: Professor Raphael Meldola, D.Sc., LL.D., V.-P.R.S. *Vice-Presidents*: Dr. George Beilby, F.R.S., and Sir Alexander Pedler, C.I.E., F.R.S. *Members of Council*: Arthur George Bloxam, Martin Onslo Forster, D.Sc., F.R.S., Sir Richard Garton, Otto Hehner, Gordon Wickham Monier-Williams, M.A., Ph.D., William Henry Perkin, LL.D., Ph.D., F.R.S., Clarence Arthur Seyler, B.Sc., Thomas Stenhouse, junr., B.Sc., A.R.S.M., and Oliver Trigger.

The Officers and Members of Council nominated for election in their stead are:—*President*: Sir James Johnston Dobbie, LL.D., D.Sc., F.R.S. *Vice-Presidents*: Dr. Martin Onslo Forster, F.R.S., Mr. Otto Hehner, Professor Arthur Smithells,* B.Sc., F.R.S. *Members of Council*: Horatio Ballantyne, Alexander Findlay, M.A., D.Sc., George Thomas Holloway, A.R.C.S., Herbert Jackson, Percy Andrew Ellis Richards, William Henry Roberts, M.Sc., Robert Robertson, M.A., D.Sc., Francis Napier Sutton, and William Lincolne Sutton.

The New Building.—Recent contributions to the Buildings Fund include a donation of £100 from Mr. John Carteighe, in fulfilment of a promise made by the late Mr. Michael Carteighe.

* In the place of Sir James J. Dobbie, who has been nominated as President.

Obituary.

Fellow.

WILLIAM WESTON was born at Leeds in 1839, and entered the Royal School of Mines in 1855, where he took the Duke of Cornwall's Scholarship in 1857, and the De la Bêche Medal in 1858. He was Admiralty Chemist from 1864 to 1904. On his retirement, he removed from Portsmouth and lived at Blackheath. He was elected a Fellow of the Institute in 1887. He died suddenly at St. Leonards, on September 8th, 1914.

Associate.

FRED WRIGHT was born at Cleckheaton in 1892. He was educated at Bradford Grammar School, and entered Leeds University in 1909, where he obtained the degree of B.Sc. with Honours in Chemistry, in June, 1913. During the long vacations of his University course, and at other times, he had worked with Messrs. Henry Ellison, Ltd., acquiring some knowledge of chemical manufacture on a large scale, and shortly after passing the Final Examination for the Associateship of the Institute, in March, 1914, he was appointed analytical chemist to the Company. He met his death in the explosion which occurred at their picric acid works at Heckmondwike, on December 2nd, 1914.

Abstracts of the Reports of Examiners.

INTERMEDIATE AND FINAL (A.I.C.) EXAMINATIONS, JANUARY, 1915.

BOARD OF EXAMINERS.—(See pp. 8—9).

The Examinations were held at the places and on the dates given below :—

Intermediate Examination : At the Institute, and at the Pharmaceutical Society, 5th to 8th January.

Final Examination :—

Branch (a), at the Institute and at the Pharmaceutical Society, 4th to 8th January.

Branch (d), at the Institute and at the Pharmaceutical Society, 4th to 8th January.

Branch (e), at the Institute and at the Pharmaceutical Society, 4th to 8th January.

Nineteen Candidates entered their names for these examinations, of whom 17 presented themselves. The results are shown in the following table :—

	NUMBER EXAMINED.	NUMBER PASSED.
Intermediate Examination	4	2
Final (A.I.C.) Examination :—		
Branch (a) Mineral Chemistry	3	2
Branch (d) Organic Chemistry	3	2
Branch (e) Chemistry of Food and Drugs, etc.	7	1*
	<u>17</u>	<u>7</u>

* In the cases of three Candidates in Branch (e), the Board recommend that they pass on satisfying the Examiners in General Chemistry at a subsequent examination.

Intermediate Examination.—The work of two Candidates, who failed, was very unsatisfactory. The qualitative exercises in particular were badly carried out, and the records of experimental work were made in a careless manner.

Final Examination.—In Branch (a) the results obtained were very fair, and the successful Candidates showed a good knowledge of methods to be adopted in the work set them. The Candidate who failed lacked experience.

In Branch (d) the successful Candidates worked uniformly well, but the Candidate who failed was weak in the theory papers and practical work, and failed in the Oral Examination in General Chemistry.

The work of the Candidates who presented themselves in Branch (e) was on the whole satisfactory. Although only one passed, three more would have done so had they satisfied the Examiners in General Chemistry. The other Candidates who failed were weak in the theoretical and practical part of the examination, and in the Examination in Therapeutics, Pharmacology and Microscopy.

A Candidate at Hongkong examined in this Branch of the Final Examination was also unsuccessful.

List of Candidates who Passed the Intermediate Examination :

Bray, Geoffrey Trelawney	...	...	Finsbury Technical College, London.
Macintyre, Ernest Gunn	...	...	B.Sc. (Glas.). The University; and the Royal Technical College, Glasgow.

List of Candidates who Passed the Final Examination for the Associateship (A.I.C.).

In Branch (a), Mineral Chemistry.

Amoore, Ronald Lewis	...	...	Finsbury Technical College, London; and under Bertram Blount, F.I.C.
Wheeler, Edward George Gidleigh	...	...	Finsbury Technical College, London; and under Bertram Blount, F.I.C., and Charles A. Keane, Ph.D., D.Sc., F.I.C.

In Branch (d), Organic Chemistry.

Naunton, William Johnson Smith	...	...	M.A. (Cantab.), B.Sc. (Lond.), Dip.Ch. (Münich). The University, Cambridge.
Shulman, Harry	...	...	B.Sc. (Lond.). East London College, London; and under Charles A. Keane, Ph.D., D.Sc., F.I.C.

In Branch (e) : The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding Stuffs, Soils, and Water.

Clark, Walter Sydney	City and Guilds Central Technical College, London.
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PAPERS SET AT THE JANUARY EXAMINATIONS.

Intermediate Examination.

GENERAL AND THEORETICAL CHEMISTRY.

TUESDAY, JANUARY 5th, 1915: 10 a.m. to 1 p.m.

(The Candidate is expected to attempt all the questions.)

1. How would you distinguish between the following pairs of substances :—

- (a) methyl alcohol and ethyl alcohol ;
- (b) methylamine and dimethylamine ;
- (c) chloracetic acid and acetyl chloride ;
- (d) aniline and diethylaniline ;
- (e) phenylacetic acid and toluic acid ?

2. Discuss fully the evidence in favour of the structural formulæ usually assigned to benzyl chloride, glycerol, pyridine and lactic acid.

3. By what reactions may primary, secondary, and tertiary nitro-paraffins be distinguished ? What is meant by the statement that nitroethane is a pseudo acid ?

4. Describe the preparation and properties of quinoline. How has its constitution been determined and what are its uses ?

5. What are the main constituents of the pyroligneous liquor obtained in the destructive distillation of wood ? How are these obtained in the pure condition and what are their chief commercial uses ?

6. Give two methods for the preparation of cinnamic acid. How has its constitution been determined, and for what purpose is it chiefly employed ?

2 p.m. to 5 p.m.

(The Candidate is expected to attempt all the questions.)

1. Give an account of the preparation and chemical behaviour of the persulphuric acids and their salts.

What is the evidence on which the relationship of permonosulphuric acid (Caro's acid) to perdisulphuric acid (persulphuric acid) is based ?

2. What do you understand by the terms catalysis, dialysis, osmosis, thermal dissociation, electrolysis ? Give an illustrative example of the meaning of each of these terms.

3. How would you prepare a pure specimen of sulphur dioxide ? What happens when this gas is passed into solutions of the following substances :—iodine, sodium arsenite, potassium dichromate, sodium carbonate, ferric chloride ?

4. What are the principal natural sources of magnesium ? How is the metal prepared and how is it employed either in the laboratory or on the large scale ?

5. What are producer gas and water gas respectively ? How are they prepared and for what purposes are they used ?

6. Give an account of the allotropic modifications of sulphur, phosphorus, and carbon, referring to any recent investigations with which you are acquainted.

PRACTICAL CHEMISTRY.

WEDNESDAY, JANUARY 6th, 1915 : 10 a.m. to 4.30 p.m.

The substance, "A" is a mixture of zinc silicate and zinc carbonate. Make quantitative determinations of Zn, SiO_2 , and CO_2 , and calculate from your results the composition of the mixture.

THURSDAY, JANUARY 7th, 1915 : 10 a.m. to 4.30 p.m.

1. Determine the percentage of sulphur in the organic substance "B."

2. Make a full qualitative analysis of the mixture "C." (Bismuth oxynitrate, lead chloride, calcium citrate: mercuric chloride, cadmium bromide, calcium oxalate. One mixture to each candidate.)

FRIDAY, JANUARY 8th, 1915 : 10 a.m. to 4.30 p.m.

1. Identify the constituents of the mixture of two organic substances, "D." Separate them and prepare a derivative from one of them. (Acetanilide, salicylic acid: acetanilide, benzoic acid. One mixture to each candidate.)

2. Make a 10 per cent. solution in water of the substance "E," and determine its specific gravity at 20° . (Cane sugar.)

Final Examinations for the Associateship.

Branch (a).—Mineral Chemistry.

MONDAY, JANUARY 4th, 1915 : 10 a.m. to 1 p.m.

(The Candidate is expected to attempt all the questions.)

1. Suggest reactions, based on your general knowledge of the chemistry of natural silicates, which you consider might form the basis of attempts to use orthoclase (approximately $\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$) as a source of potassium salts.

2. State the chief sources of iodine and give an account of the progress which has been made from time to time in the industrial preparation of iodine from them.

3. Write a short essay on any one of the following: the passivity of iron, the constitution of alloys, the relation of carbon to iron in steel.

4. State what you know of the manufacture, composition and general properties of the different types of glass, exclusive of special optical glass, used in industries.

5. Describe and discuss as many modes of formation of hydrogen peroxide as you can.

TUESDAY, JANUARY 5th, 1915: 10 a.m. to 4.30 p.m.

Report on the composition of the gunpowder. Calculate your results to percentages on the powder dried for one hour at 70° C.

(If necessary this exercise may be completed on the second day.)

WEDNESDAY and THURSDAY, JANUARY 6th and 7th, 1915: 10 a.m. to 4.30 p.m.

Determine (a) the manganese in the sample of steel; (b) the antimony in the sample of lead; (c) the lead in the sample of brass.

(Any final weighings may be done on the fourth day.)

FRIDAY, JANUARY 8th, 1915: 10 a.m. to 4.30 p.m.

Report on the qualitative composition of the sample of aluminium and on the percentage of silicon in it.

Branch (d). Organic Chemistry.

MONDAY, JANUARY 4th, 1915: 10 a.m. to 1 p.m.

(The candidate is expected to attempt all the questions.)

1. How may cyanamide be prepared in quantity? Give an account of the more important reactions of this substance and indicate its possible technical applications.

2. Write a concise account of the "trivalent carbon atom," indicating the stage to which our knowledge of this subject has attained.

3. Give an account of the chemistry of isatin and state methods for the synthetic preparation of this substance.

4. What isomeric forms of cinnamic acid are recognised and how may these substances be prepared? What evidence can be given of the separate existence of the several isomerides and how may the isomerism be explained?

5. Describe briefly the experimental methods used in determining the radicals (a) :O, CH₃, (b) :CO, NH₂, (c) :CN, and (d) :CO, when present as molecular components of organic substances.

TUESDAY and WEDNESDAY, JANUARY 5th and 6th, 1915 :

10 a.m. to 4.30 p.m.

1. Ascertain the nature of the given coal-tar dye A. Prepare from it two crystalline aromatic compounds and characterise them as fully as you can. (Benzopurpurin.)
2. Determine the percentage of aniline present as a salt in the given aqueous solution, B.

THURSDAY and FRIDAY, JANUARY 7th and 8th, 1915 : 10 a.m. to

4.30 p.m.

1. You are provided with 20 grams of azobenzene. Prepare from it the maximum yield of pure hydrazobenzene.
2. The solution C is a mixture of an acid with its ethyl ester. Determine the percentage of acid and ester present and from your results calculate the molecular weight of the acid.

Branch (c).—The Chemistry and Microscopy of Food and Drugs.

Fertilisers and Feeding Stuffs, Soils and Water.

MONDAY, JANUARY 4th, 1915 : 10 a.m. to 1 p.m.

1. Describe clearly one form of polarimeter and explain the various uses to which it may be applied in food analysis.
2. Describe the methods you would adopt for the detection and estimation of minute amounts of lead and zinc present together in water.
3. Give, with all essential detail, the process you consider best for the detection and estimation of a poisonous salt of antimony in a specimen of porridge.

(Answer in a separate book.)

1. What active principles are present in foxglove leaves ? Enumerate the official preparations which are made from the leaves, and give their proper doses. What symptoms would you expect to follow upon an overdose of any one of them ?
2. How is atropine prepared from belladonna root ? Give a full account of the chemistry of this alkaloid and of its pharmacological uses.
3. In what official preparations is arsenious acid administered ? How would you detect and estimate arsenic in the contents of the stomach of an individual to whom a large dose of bismuth had been administered just before death ?
4. In what forms are the following drugs eliminated from the body : chloral hydrate, carbolic acid, salicylic acid, benzoic acid ?

2 p.m. to 5 p.m.

1. Examine microscopically the deposit in the urine A and report upon its nature. The same urine contains an alkaloid which you are to identify.
2. Prepare the osazones of the sugars contained in the solutions B and C. Examine the crystals microscopically and report upon the probable nature of the sugars.
3. Examine microscopically the powder D and report upon its constituents.

Oral Examination in the Recognition of Drugs and Chemicals.

TUESDAY, JANUARY 5th, 1915: 10 a.m. to 4.30 p.m.

1. Analyse fully the sample of cocoa, A, and report as to its genuineness or otherwise.

(This exercise may be completed to-morrow.)

2. Identify the drug, B, by microscopical examination. Sketch the structures observed and mount a permanent specimen in Canada balsam. (Powdered colocynth.)

WEDNESDAY, JANUARY 6th, 1915: 10 a.m. to 4.30 p.m.

1. Complete the analysis of the cocoa.
2. Analyse the lard, C, and write out a certificate on the Sale of Food and Drugs Acts form provided.

THURSDAY, JANUARY 7th, 1915: 10 a.m. to 4.30 p.m.

1. Examine the coffee, D, for the presence of a poison, and if found make a quantitative estimation. (Potassium dichromate.)
2. Examine the pepper, E, microscopically and report as to its purity.

FRIDAY, JANUARY 8th, 1915: 10 a.m. to 4.30 p.m.

1. Identify the three drugs, F, G, and H.
2. Find the alcoholic strength of the liqueur, K, and determine the total acidity and the acidity of the distillate.

Candidates for the Final Examination were required to translate passages from French and German technological literature.

TRANSLATION, JANUARY 4TH, 1915.

Time allowed: 1½ hours.

Translate into English.

Lösungen gewisser organischer Kolloide haben die Fähigkeit, zu Hydrosolen anorganischer Stoffe zugesetzt die Ausfällung der letzteren

durch Elektrolyte wesentlich zurückzuhalten. R. Zsigmondy bezeichnet diese Wirkung des organischen Kolloids als Schutzwirkung auf die Teilchen des Hydrosols und fand zunächst, dass verschiedene organische Kolloide in der Intensität ihrer Schutzwirkung wesentlich differieren. Als besonders wirksames Schutzkolloid erweist sich der Leim; d.h., fügt man z. B. ganz minimale Mengen einer Leimlösung zu Goldhydrosol, das sonst durch Spuren zugefügter Kochsalzlösung sofort einen Farbenwechsel von rot in blau zeigt, so tritt in dem nunmehrigen Gemenge auch durch Zufügung grösserer Mengen von Kochsalzlösung keinerlei Veränderung ein. Es ist also ersichtlich, dass der Zusatz eines Schutzkolloids das sonst sehr empfindliche Sol wesentlich unempfindlicher und daher haltbarer macht. Hat man daher nach irgend einer Methode ein Hydrosol gewonnen und Sorge dafür getragen, dass bei der Entstehung ein Schutzkolloid zugegen war, so ist nicht mehr die völlige Entfernung der Elektrolyte nötig, da das Schutzkolloid deren ausfällende Wirkung abschwächt. Hierauf beruht die Anwendung der Schutzwirkung zur Herstellung anorganischer Hydrosole, die sich in zahlreichen Fällen bewährt hat.—*A. Müller.*

L'OXYGÈNE ACTIF ET L'ÉTAT NAISSANT.—L'influence de l'état naissant sur les substances médicamenteuses a fait l'objet d'une communication récente à l'Académie de Médecine par M. le Dr. Albert Robin.

L'état naissant est l'état que prennent les corps au moment même où ils se dégagent de leurs combinaisons.

A cet état, les corps jouissent de propriétés particulièrement actives qui permettent dans ces conditions, de pouvoir augmenter l'action des médicaments en thérapeutique ou des produits chimiques mis en œuvre dans les applications industrielles, afin d'arriver à leur faire rendre le maximum d'effet utile avec le minimum de substance.

A propos du rôle de l'ozone en thérapeutique, et de la préparation de l'ozone par les peroxydes, nous avons vu qu'il se formait de l'ozone et de l'eau oxygénée avec certains peroxydes en présence des acides.

L'eau oxygénée doit ses propriétés antiseptiques énergiques à ce que ce corps dégage, au contact des tissus de l'organisme, de l'oxygène naissant dont l'activité se trouve exaltée.

Les peroxydes de sodium, de potassium, de magnésium, de cadmium et de zinc, corps suroxygénés, sont de puissants antiseptiques intestinaux, par suite de la mise en liberté de l'oxygène à l'état naissant, au contact de tissus organiques qui détruit les toxines, causes des fermentations intestinales.—*H. De la Coux.*

LIST OF FELLOWS, ASSOCIATES, STUDENTS AND CANDIDATES FOR EXAMINATION SERVING WITH THE COLOURS.

*It is requested that any inaccuracy or omission be reported
immediately to the Registrar.*

FELLOWS.

- Agnew, J. W., 2nd Lieut. 3rd Highland Light Infantry.
 Alton, Lester St. John, Corporal Hon. Artillery Company.
 Archbutt, S. L., Corporal 28th County of London Regiment (Artists' Rifles).
 Auld, S. J. M., Lieut. 4th Battalion Royal Berkshire Regiment.
 Bacon, G. N., Corporal London Electrical Engineers.
 Baker, M. S., Public School Battalion, Royal Naval Division.
 Barke, H. F., Bombardier Gloucester Royal Field Artillery (T.F.).
 Blair, R. W., 2nd Lieut. 10th East Lancashire Regiment.
 Bridge, S. W., Lance-Corporal 10th (Service) Battalion Royal Fusiliers.
 Brown, B. M., 2nd (Reserve) Battalion, 28th County of London Regiment (Artists' Rifles).
 Bruce, Robert, 9th Battalion (Highlanders) The Royal Scots.
 Caw, William, 17th (Service) Battalion Highland Light Infantry.
 Claremont, C. L., 2nd Lieut. (Reserve of Officers) 5th Battalion King's Royal Rifle Corps.
 Clement, Leonard, P. S. U. Battalion Royal Fusiliers.
 Elliott, Stanley, Lieut. 4th Battalion (London Regiment) Royal Fusiliers.
 Eynon, Lewis, Royal Fusiliers (Sportsmen's Battalion).
 Ferrey, C. E. C., 1st City of London Sanitary Company, R.A.M.C.
 Foster, J. A., Captain East Yorks Regiment.
 Gadd, W. L., Lieut. Colonel Kent Royal Garrison Artillery (Service Corps).
 Guttmann, L. F., Captain 2nd Battalion Canadian Expeditionary Force.
 Heap, Harri, Cadet Manchester University O.T.C.
 Heilbron, J. M., Captain A.S.C. (T.F.).
 Hill, J. R., 16th Battalion Prince of Wales Own (West Yorkshire) Regiment.
 Hills, J. S., Able Bodied Seaman, Royal Naval Volunteer Reserve, Anti-Aircraft Corps.

Hodgson, T. R., Lieut. East Lancs. Divisional Transport and Supply Column, A.S.C. (T.F.).
 Howard, B. F., 2nd Lieut. 28th (Reserve) London Regiment (Artists Rifles).
 Joy, A. S., 19th Battalion Royal Fusiliers (P.S.U. Brigade).
 Kirkham, V. H., Captain East African Medical Service (Analyst to the Forces).
 Knight, L., 2nd Lieut. Royal Field Artillery.
 Law, D. J., 9th Battalion King's Royal Rifles.
 Liversedge, S. G., 3rd Wiltshire Regiment.
 Lucas, E. W., Able-Bodied Seaman, Royal Naval Volunteer Reserve, Anti-Aircraft Corps.
 Luff, A. P., Major R.A.M.C. (T.F.).
 Mercer, Thomas, Lieut. 10th (Service) Battalion Hants Regiment.
 Merrett, W. H., Captain R.E. (T.F.), London Electrical Engineers.
 Monier-Williams, G. W., Captain 12th (Reserve) Battalion County of London.
 Nash, L. M., Captain 7th (Service) Battalion Gloucestershire Regiment.
 Robison, R., Lieut. 1st London Sanitary Company, R.A.M.C.
 Smith, T. A., 2nd Lieut. 5th Battalion Lincolnshire Regiment.
 Trotman, S. R., Captain, Officer Commanding University College, Nottingham, O.T.C.

ASSOCIATES.

Allan, J. L. S., Lieut. 7th Battalion King's Own Scottish Borderers.
 Amore, R. L., 2nd London Sanitary Company, R.A.M.C. (T.F.).
 Bainbridge, J. S., Sergeant 4th Yorkshire Regiment.
 Cheke, T. W., Cyclist 25th (Reserve) Battalion London Regiment (Cyclists).
 Christie, J. H., 2nd South Midland Field Ambulance, R.A.M.C.
 Collins, Cecil G., Lance-Corporal 2nd 23rd Battalion London Regiment (T.F.).
 Crawford, F. A. F., Lieut. Royal Scottish Fusiliers.
 Cunningham, A., 5th Scottish Rifles.
 Dingwall, A., 2nd Lieut. 13th (Service) Battalion Highland Light Infantry.
 Doidge, R. M., Lance-Sergeant 6th (Service) Battalion Duke of Cornwall's Light Infantry.
 Dunn, R. J., 2nd Lieut. 12th Battalion Royal Warwickshire Regiment.
 Evans, B. S., 28th County of London (Artists Rifles).
 Evans, H. J., Lieut. 2nd Welsh Brigade, Royal Field Artillery.
 Georgi, C. D. V., 2nd Lieut. 13th Battalion Royal Fusiliers.
 Harris, J. W., 2nd Lieut. 3rd Battalion Lincolnshire Regiment (Special Reserve), British Expeditionary Force.
 Hay, J. G., 3rd City Battalion King's Liverpool Regiment.
 Jones, E. O., 2nd Lieut. 7th East Yorkshire Regiment.
 Kent-Jones, D. W., P.S. Brigade, 19th (Service) Battalion Royal Fusiliers.
 Krall, Hans, Trooper United Provinces Horse (India).

Laughton, F. E., 2nd Lieut. 4th Battalion Queen's Own Cameron Highlanders.
 Masters, E. A., Captain 2nd London Division Transport and Supply Column, A.S.C.
 McDonald, Donald, 2nd Lieut. 11th (Service) Battalion Middlesex Regiment.
 Miller, T. B., Captain City of Aberdeen Fortress Royal Engineers.
 Pattison, J. W. H., Captain 8th Scottish Rifles (T.F.).
 Potter, F. M., Corporal London Scottish, British Expeditionary Force.
 Rayner, E. A., Rifleman 9th (Reserve) Battalion City of London Regiment.
 Saunders, W. G., Lieut. 5th Battalion King's Liverpool Regiment.
 Smeaton, T. F., 2nd Lieut. 5th (Reserve) Scottish Rifles (Cameronians).
 Smith, E. W., 1st London Sanitary Company, R.A.M.C. (T.F.).
 Solomon, J. B., Sergeant 28th County of London (Artists Rifles), British Expeditionary Force.
 Thurston, F. S., Corporal Civil Service Rifles.
 Vernon, Harold, 28th County of London (Artists Rifles).
 Wheeler, E. G., University of London O.T.C.
 White, F. D., 2nd Lieut. 13th Battalion Highland Light Infantry.
 White, J. C., 2nd Lieut. 7th (Service) Battalion Border Regiment.
 Wilson, Lothian, 2nd Lieut. 4th Divisional Supply Column, A.S.C., British Expeditionary Force.

STUDENTS.

Archibald, J. D., 2nd Lieut. 10th (Service) Battalion Essex Regiment.
 Bachrach, R., Lance-Corporal London Electrical Engineers (T.F.).
 Bagshaw, W. N., University of London O.T.C. (T.F. unattached).
 Barry, W. R., Lieut. 11th (Service) Battalion Scottish Rifles.
 Bateman, A. H., London Rifle Brigade (T.F.).
 Bishop, J. E., 2nd Lieut. 10th East Lancashire Regiment (Service Battalion).
 Bishop, R. O., Hon. Artillery Company (Infantry Battalion).
 Bowyer, E. G., Trooper 4th Mounted Rifles.
 Boyd, Gavin, 2nd Lieut. 14th Argyll and Sutherland Highlanders.
 Brooke, H. W., 2nd Lieut. 7th (Service) Battalion, East Yorkshire Regiment.
 Bruckman, R. T., 2nd Lieut. 4th Border Regiment.
 Bull, P. C., 2nd Lieut. 8th (Service) Battalion Suffolk Regiment.
 Bunbury, H. M., Bristol University O.T.C. (T.F. unattached).
 Buttrick, H. P., 10th Middlesex Regiment (T.F.).
 Carlisle, W. F., Sheffield City Battalion York and Lancaster Regiment.
 Carson, S. D., 2nd Lieut. 7th Battalion Royal Scots Fusiliers.
 Child, A. J., 2nd Lieut. 28th County of London (Artists Rifles), British Expeditionary Force.
 Clark, L. M., London Scottish (14th County of London).
 Clark, Robert, Lothian and Border Horse.
 Clarke, L. H., 3rd City Battalion King's Liverpool Regiment.

- Clement, J., 2nd Lieut. 10th (Service) Battalion Hampshire Regiment.
 Cottrall, L. G., Royal Fusiliers, Public Schools and University Brigade.
 Dalton, John, 28th County of London (Artists Rifles), British Expeditionary Force.
 Dennett, S. H., 2nd Battalion City of Birmingham.
 Doidge, H. F., Lieut. Army Service Corps (Analytical Chemist).
 Dunsmore, Adam, 3rd Lowland Field Ambulance, R.A.M.C. (T.F.).
 Figg, E. F., Surrey Yeomanry, 27th Division, British Expeditionary Force.
 Follows, G. S., 2nd Lieut. 12th (Service) Battalion King's Liverpool Regiment.
 Fraser, F. J., 10th Liverpool Scottish.
 Frith, J. S., 4th (Prince of Wales Volunteers) South Lancashire Regiment.
 Gale, R. C., Corporal London Electrical Engineers.
 Garland, T., 20th County of London Regiment.
 Garnett, K. G., A.B. Seaman on H.M.S. *Sagitta*.
 Geake, Arthur, 8th Royal Warwickshire Regiment.
 Gibson, Stanton, 2nd Lieut. 9th Gloucestershire Battalion.
 Greaves, Reginald, Corporal 3rd City Battalion King's Liverpool Regiment.
 Hatfield, C. G. M., London Electrical Engineers (T.F.).
 Hayward, C. O., 2nd Lieut. 7th Battalion Lincolnshire Regiment.
 Henry, John, Lieut. 4th Battalion Royal Scots Fusiliers.
 Hodgkin, A. E., Captain 5th Battalion Cheshire Regiment.
 Hornby, A. J. W., 160th Battery Royal Field Artillery.
 Islip, H. T., 2nd London Sanitary Company, R.A.M.C. (T.F.).
 Johnson, J. C., 19th County of London (T.F.).
 Joynson, George, 11th Battalion Lancashire Fusiliers.
 Kind, R. G., Lance-Corporal 5th Battalion Cheshire Regiment.
 King, John, University College, Nottingham O.T.C.
 Le Brocq, L. F., 23rd London Regiment.
 Levingston, H. G., 2nd Lieut. Army Service Corps.
 Linzell, L., A.V.C., 2nd London Division (T.F.).
 Lynch, G. Roche, Surgeon, Royal Naval Hospital, Malta.
 Mackenzie, P., 2nd Lieut. 14th Argyll and Sutherland Highlanders.
 Maclean, Alexander, 17th Battalion Highland Light Infantry.
 McDougall, Duncan, 17th (Service) Battalion Highland Light Infantry.
 McLachlan, T. M., 58th Field Ambulance, R.A.M.C.
 Mendoza, E., 8th (Cyclist) Battalion Essex Regiment (attached to Royal Aircraft Factory).
 Merheim, G. A., Public Schools and University Brigade (2nd Battalion) Royal Fusiliers.
 Mitchell, C. A. D., 2nd Lieut. 4th (Reserve) Battalion Devon Regiment (T.F.).
 Moore, G. W., Queen's Westminster Rifles (T.F.).
 Mumford, E. M., Captain Lancashire Fusiliers.
 Needs, F. E., Corporal Motor Cycle Despatch Rider, Army Signals, R.E., British Expeditionary Force.
 Newitt, L. D., City of London Royal Fusiliers (Sportsmen's Battalion).

- Northover, R., Lieut. 2nd Battalion Lancashire Fusiliers, British Expeditionary Force.
- Oates, Frank, 4th Battalion Grenadier Guards.
- Parker, H. V., 2nd Lieut. Royal Field Artillery.
- Patterson, A. A., 2nd Lieut. 6th Battalion Border Regiment.
- Pickard, C. E., 2nd Lieut. 8th Battalion North Staffordshire Regiment.
- Robertson, J. A., 9th Gordon Highlanders, Highland Light Infantry.
- Rogers, E. W., Lieut. 11th (Service) Battalion West Riding Regiment.
- Ross, Kenneth, 2nd Lieut. 4th Battalion Royal Irish Rifles.
- Ruddock, F. A., 12th Battalion York and Lancaster Regiment.
- Rudolf, M. E., 9th County of London (Q.V.R.), (T.F.).
- Sanderson, F. W., 28th Battalion County of London (Artists Rifles) (T.F.), British Expeditionary Force.
- Senior, Alan, 4th West Riding Brigade Royal Field Artillery.
- Shipston, G. T., 2nd Lieut. 5th (Reserve) Battalion Leicestershire Regiment.
- Silvester, W. A., Cadet Sheffield University O.T.C.
- Smith, G. E., 2nd Lieut. 3rd Battalion Argyll and Sutherland Highlanders.
- Smith, L. P., 2nd Lieut. 57th Co. Royal Garrison Artillery.
- Spicer, J. I., Lieut. 7th Battalion East Lancashire Regiment.
- Stearn, J. H., 2nd Lieut. 14th Durham Light Infantry.
- Stephens, H. C., 1st Battalion Hon. Artillery Company, British Expeditionary Force.
- Stockdale, E. L. J., 2nd Lieut. 10th (Service) Battalion Lancashire Fusiliers.
- Suckling, Ernest, Mobile Analytical Laboratory, British Expeditionary Force.
- Taylor, H. F., 2nd Lieut. Royal Garrison Artillery.
- Webster, H. G., 2nd Battalion City of Birmingham.
- Whitham, R. P. M., Manchester University O.T.C.
- Wilson, D. M., Cyclist, 25th County of London (Reserve) Battalion (T.F.).

CANDIDATES FOR EXAMINATION.

- Brekke, L. O., 2nd Lieut. 7th Battalion East Yorkshire Regiment.
- Cunnew, G. A., 2nd Lieut. 7th (Service) Battalion Royal Berkshire Regiment.
- Cunnington, F. W. B., 2nd Lieut. A.S.C.
- Janson, J. T., 2nd Lieut. 7th King's Own Yorkshire Light Infantry.
- Leitch, Eoin, Lieut. 5th Battalion Argyll and Sutherland Highlanders.
- McConnan, James, Corporal 12th King's Liverpool Regiment.
- Meads, J. A., 12th Battalion Sherwood Foresters.
- Quibell, A. H., 8th (Reserve) Battalion Sherwood Foresters, Notts and Derby Regiment.

Rait, P. W., Lance-Corporal 3rd Glasgow (Commercial) Battalion Highland Light Infantry.

Reynard, Herbert C., 2nd Lieut. 10th East Surrey Regiment.

Sewill, J. W., 2nd Lieut. 5th Battalion London Rifle Brigade (T.F.)

Snell, F. S., 2nd Lieut. 6th Battalion Royal Berkshire Regiment.

Stigand, I. A., 5th Royal West Kent Regiment (transport officer).

Thin, R. G., 9th Royal Scots.

Vulliamy, B. L., Public Schools Brigade (2nd Battalion), Royal Fusiliers City of London Regiment.

Ward, A. R., 2nd London Sanitary Company, R.A.M.C.

Webb, H. W., Royal Warwickshire Regiment (12th) 2nd Birmingham Battalion.

Junior Clerk, Office of the Institute :

Andrews, J. B., Rifleman, Service Battalion, 11th County of London Regiment (Finsbury Rifles).

The Register.

Since the publication of Proceedings, Part IV., in November, 1914, the Council have elected 6 new Associates; 4 Associates have been elected to the Fellowship, and 21 Students have been admitted.

The deaths of 2 Fellows and 1 Associate and 1 Student have been reported.

Associates Elected to the Fellowship.

- Duff, James Cooper, M.Sc. (Mane.), The Technical College, Huddersfield.
 Hawley, Herbert, M.Sc. (Bim.), Analyst's Laboratory, 44, Broad Street, Birmingham.
 Pratt, Walter Ryley, B.Sc. (Lond.), 19, Chequergate, Louth, Lincs.
 Suggett, Arthur Frederick, 134, Rusthall Avenue, Bedford Park, London, W.

New Associates.

- Amoore, Ronald Lewis, 79, Erpingham Road, Putney, London, S.W.
 Clark, Walter Sydney, 81, George Street, Luton.
 Naunton, William Johnson Smith, M.A. (Cantab.), B.Sc. (Lond.), Dip. Ch. (Münich), The Thoroughfare, Woodbridge, Suffolk.
 Shulman, Harry, B.Sc. (Lond.), 21, Tredegar Square, Mile End, London, E.
 Smeaton, Thomas Frederick, 15, Ormonde Avenue, Muirend, near Glasgow.
 Wheeler, Edward George Gidleigh, 250, Amhurst Road, Stoke Newington, London, N.

New Students.

- Barclay, Alexander, 53, Cross-Oak Road, Berkhamsted, Herts.
 Becker, Harry Galvin, 15, York Road, Rathgar, Co. Dublin.
 Berridge, Jesse Dell, Norton House, High Stone, Leytonstone, London, N.E.
 Carson, Samuel David, Trades Hotel, Ayr.
 Evans, Tudor Idris James, 102, Donald Street, Roath, Cardiff.
 Forrester, Charles, 4, Barclay Terrace, Edinburgh.
 Gordon, Peter Ferguson, 15, Windsor Gardens, Musselburgh, Scotland.

Haythornthwaite, Alan, 79, West Side, Clapham Common, London, S.W.
 Hislop, Stephen Lunn, 17, Melville Terrace, Edinburgh.
 Hoffmann, Herbert, 17, Cathcart Hill, Highgate, London, N.
 Hutchison, George Lewis, 33, Artillery Road, Guildford.
 Levingston, Hugh George, 27, Oakley Road, Ranelagh, Dublin.
 Ogilvie, James, 368, Easter Road, Leith, Scotland.
 Porter, James Walker, Royal College of Science, Dublin.
 Roger, Robert, 243, Strathmartin Road, Dundee.
 Stephens, Victor Ewart, 79, Rathmines Road, Dublin.
 Stewart, Robert Forbes, 35, Roxburgh Circus, Cardonald, Glasgow.
 Storer, George Paterson, 48, Llanthewy Road, Newport, Mon.
 Sutton, Francis Colin, 21, Lydford Road, Cricklewood, London, N.W.
 Whitworth, Abraham Bruce, 244, Garngad Hill, Glasgow.
 Woodworth, William Fitzgerald, 63, Kenilworth Square, Rathgar, Co.
 Dublin.

DEATHS.

Fellows.

Weston, William, A.R.S.M.
 Woollatt, George Henry, Ph.D. (Göttingen).

Associate.

Wright, Fred. B.Sc. (Leeds).

Student.

Menzies, Robert Charles.

General Notices.

Examinations: April and July, 1915.—The Intermediate Examination will commence on Tuesday, April 13th. Final Examinations in (*a*) Mineral Chemistry, (*b*) Metallurgical Chemistry, (*c*) Physical Chemistry, (*d*) Organic Chemistry, and (*e*) The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding Stuffs, Soils, and Water, will commence on Monday, April 12th, or on Monday, April 19th, 1915.

The Examination in Branch (*e*) will also be open to Fellows and Associates who desire to obtain the Certificate of the Institute in Therapeutics, Pharmacology, and Microscopy, which is approved by the Local Government Boards under the Regulations as to the competency of Public Analysts.

The list of Candidates for the April examinations will be closed on Tuesday, March 9th.

Intermediate and Final Examinations will also be held at the Laboratories of the Institute in July. The exact dates and other particulars will be forwarded to intending Candidates in due course.

Examinations in Chemical Technology, April, 1915.—The Council will be prepared to arrange examinations in Chemical Technology to be held in April, 1915. The examinations will be open only to Fellows and to those Associates who have been registered as such for at least one year, who produce evidence of practical technological training.

Fellows and Associates who desire to present themselves are required to send in their applications not later than Tuesday, March 9th, 1915.

Forms of application and full particulars can be obtained from the Registrar.

Examination in Biological Chemistry.—An Examination in Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action will be held in October, 1915.

Notice to Associates.—Associates elected prior to February, 1912, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of Chemistry, for at least three years since their election to the Associateship, may obtain forms of application for election to the Fellowship.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, enquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in making known suitable appointments for professional chemists.

THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED, 1877.
INCORPORATED BY ROYAL CHARTER. 1885.

PROCEEDINGS,
1915.

PART II.

OFFICERS, COUNCIL, AND COMMITTEES, 1915-16.

ANNUAL GENERAL MEETING, MARCH 1st, 1915.

THE ADDRESS OF THE RETIRING PRESIDENT:

PROFESSOR RAPHAEL MELDOLA, D.Sc., LL.D., F.R.S.

PROCEEDINGS OF THE COUNCIL (FEBRUARY—MARCH, 1915).
OBITUARY.

THE LIBRARY.

MEMBERS AND STUDENTS WITH THE COLOURS.

CHANGES IN THE REGISTER.

NOTICES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,

Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,

April, 1915.

LIST OF OFFICERS AND COUNCIL

For the Year ending March 1st, 1916.

PRESIDENT:

SIR JAMES JOHNSTON DOBBIE, LL.D., D.Sc., F.R.S.

VICE-PRESIDENTS:

EDWARD JOHN BEVAN.
 MARTIN ONSLOW FORSTER, D.Sc., F.R.S.
 OTTO HEHNER.
 SIR BOVERTON REDWOOD, BART., D.Sc.
 ARTHUR SMITHELLS, B.Sc., F.R.S.
 EDWARD WILLIAM VOELCKER, A.R.S.M.

HON. TREASURER:

ALFRED GORDON SALAMON, A.R.S.M.

MEMBERS OF COUNCIL:

LEONARD ARCHBUTT.
 HORATIO BALLANTYNE.
 ROBERT FREDERICK BLAKE.
 WILLIAM THOMAS BURGESS.
 CECIL HOWARD CRIBB, B.Sc.
 CHARLES FREDERICK CROSS, B.Sc.
 GEORGE EMBREY.
 ALEXANDER FINDLAY, M.A., D.Sc.
 GILBERT JOHN FOWLER, D.Sc.
 ARTHUR HARDEN, D.Sc., Ph.D., F.R.S.
 CHARLES ALEXANDER HILL, B.Sc.
 EDWARD HINKS, B.Sc.
 WILLIAM RICHARD EATON HODGKINSON, Ph.D.
 GEORGE THOMAS HOLLOWAY, A.R.C.S.
 HERBERT JACKSON.
 ALFRED HENRY KNIGHT.
 HENRY RONDEL LE SUEUR, D.Sc.
 WILLIAM MACNAB.
 FRANCIS RICHARD O'SHAUGHNESSY, A.R.C.S.
 PERCY ANDREW ELLIS RICHARDS.
 WILLIAM HENRY ROBERTS, M.Sc.
 ROBERT ROBERTSON, M.A., D.Sc.
 FREDERICK WALLIS STODDART.
 FRANCIS NAPIER SUTTON.
 WILLIAM LINCOLNE SUTTON.
 WILLIAM HENRY WILLCOX, M.D., B.Sc.
 JAMES WOODWARD, B.A., B.Sc.

CENSORS:

THE PRESIDENT, *ex-officio*.GEORGE THOMAS BEILBY, LL.D., F.R.S., *Past-President*.PERCY FARADAY FRANKLAND, LL.D., Ph.D., F.R.S., *Past-President*.DAVID HOWARD, *Past-President*.RAPHAEL MELDOLA, D.Sc., LL.D., V.-P.R.S., *Past-President*.

BOARD OF EXAMINERS FOR THE ASSOCIATESHIP AND FELLOWSHIP, 1915-16.

Chairman: THE PRESIDENT.*Examiners for the Intermediate Examination and in General Chemistry:*

HAROLD GOVETT COLMAN, Ph.D., M.Sc.

ARTHUR WILLIAM CROSSLEY, D.Sc., Ph.D., F.R.S.

Examiners for the Final Examination:(a) **Mineral Chemistry:** GEORGE NEVILL HUNTLY, B.Sc., A.R.C.S.(b) **Metallurgical Chemistry:** CECIL HENRY DESCH, Ph.D., D.Sc.(c) **Physical Chemistry:** FREDERICK GEORGE DONNAN, M.A., Ph.D., F.R.S.(d) **Organic Chemistry:** WILLIAM JACKSON POPE, M.A., F.R.S.(e) **The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water:** BERNARD DYER, D.Sc.**Therapeutics, Pharmacology, and Microscopy:** FREDERICK GOWLAND HOPKINS, D.Sc., M.B., F.R.S.(f) **Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action:** ALFRED CHASTON CHAPMAN.

CHEMICAL TECHNOLOGY EXAMINATIONS BOARD:

Chairman: THE PRESIDENT.*Vice-Chairman:* DAVID HOWARD.

G. T. BEILBY, LL.D., F.R.S., BERTRAM BLOUNT, FRANCIS H. CARR, H. G. COLMAN, M.Sc., Ph.D., C. F. CROSS, B.Sc., W. S. CURPHEY, PERCY F. FRANKLAND, LL.D., F.R.S., FRANK W. HARBORD, A.R.S.M., G. G. HENDERSON, M.A., D.Sc., LL.D., C. A. KEANE, D.Sc., Ph.D., EDMUND J. MILLS, D.Sc., F.R.S., SIR BOVERTON REDWOOD, BART., D.Sc., A. GORDON SALAMON, A.R.S.M., AND J. MILLAR THOMSON, LL.D., F.R.S.

HON. AUDITORS:

PERCY EDWIN SPIELMANN, Ph.D., B.Sc., HERBERT FREDERICK STEPHENSON, A.R.C.S., AND EDWARD FRANK HARRISON, B.Sc.

REGISTRAR AND SECRETARY:

RICHARD BERTRAM PILCHER.

Committees for 1915-1916.

FINANCE COMMITTEE:

THE PRESIDENT, WITH H. BALLANTYNE, W. T. BURGESS, C. A. HILL, EDWARD HINKS, A. GORDON SALAMON*, F. N. SUTTON, E. W. VOELCKER, AND JAMES WOODWARD.

HOUSE COMMITTEE:

THE PRESIDENT, WITH EDWARD J. BEVAN*, CECIL H. CRIBB, M. O. FORSTER, EDWARD HINKS, AND A. GORDON SALAMON.

INSTITUTIONS COMMITTEE:

THE PRESIDENT, WITH CECIL H. CRIBB, M. O. FORSTER*, G. J. FOWLER, ARTHUR HARDEN, W. R. E. HODGKINSON, G. T. HOLLOWAY, HERBERT JACKSON, H. R. LE SUEUR, WILLIAM MACNAB, A. SMITHELLS, AND W. H. WILLCOX.

NOMINATIONS AND EXAMINATIONS COMMITTEE:

THE PRESIDENT*, WITH LEONARD ARCHBUTT, EDWARD J. BEVAN, W. T. BURGESS, CECIL H. CRIBB, C. F. CROSS, A. FINDLAY, M. O. FORSTER, G. J. FOWLER, ARTHUR HARDEN, C. A. HILL, EDWARD HINKS, W. R. E. HODGKINSON, G. T. HOLLOWAY, HERBERT JACKSON, A. H. KNIGHT, H. R. LE SUEUR, F. R. O'SHAUGHNESSY, P. A. ELLIS RICHARDS, R. ROBERTSON, A. GORDON SALAMON, A. SMITHELLS, F. W. STODDART, E. W. VOELCKER, W. H. WILLCOX, AND JAMES WOODWARD.

PROCEEDINGS COMMITTEE:

THE PRESIDENT, WITH LEONARD ARCHBUTT, H. BALLANTYNE, EDWARD J. BEVAN, GEORGE EMBREY, M. O. FORSTER, H. R. LE SUEUR, W. H. ROBERTS, F. W. STODDART, W. L. SUTTON, AND E. W. VOELCKER*.

SPECIAL COMMITTEES.

LIBRARY COMMITTEE:

THE PRESIDENT, WITH C. F. CROSS, W. P. DREAPER, ARTHUR HARDEN, OTTO HEHNER, C. A. KEANE, ARTHUR R. LING, GEORGE MCGOWAN, H. DROOP RICHMOND, A. GORDON SALAMON*, J. MILLAR THOMSON, AND THE EXAMINERS.

PUBLIC APPOINTMENTS COMMITTEE:

THE PRESIDENT*, WITH LEONARD ARCHBUTT, G. T. BEILBY, EDWARD J. BEVAN, R. F. BLAKE, A. CHASTON CHAPMAN, J. H. COSTE, CECIL H. CRIBB, CYRIL DICKINSON, BERNARD DYER, M. O. FORSTER, OTTO HEHNER, C. A. HILL, EDWARD HINKS, DAVID HOWARD, G. C. JONES, P. A. ELLIS RICHARDS, A. GORDON SALAMON, F. W. STODDART, SIR WILLIAM TILDEN, E. W. VOELCKER, J. A. VOELCKER, W. H. WILLCOX, W. M. GATHORNE YOUNG, AND A REPRESENTATIVE OF THE IRISH ANALYSTS' ASSOCIATION AND OF THE ASSOCIATION OF PUBLIC ANALYSTS FOR SCOTLAND.

* CHAIRMAN.

† VICE-CHAIRMAN.

SPECIAL COMMITTEES—(continued).

SPECIAL FINANCE COMMITTEE:

Re BUILDINGS FUND.

THE PRESIDENT*.

PAST PRESIDENTS: G. T. BEILBY, PERCY F. FRANKLAND†, DAVID HOWARD, RAPHAEL MELDOLA, J. MILLAR THOMSON, AND SIR WILLIAM TILDEN.

VICE-PRESIDENTS: EDWARD J. BEVAN, M. O. FORSTER, OTTO HEHNER, SIR BOVERTON REDWOOD, BART., ARTHUR SMITH-ELLS, AND E. W. VOELCKER.

THE HON. TREASURER AND FINANCE COMMITTEE.

THE HOUSE COMMITTEE.

W. E. ADENEY, BERTRAM BLOUNT, A. CHASTON CHAPMAN, FRANK CLOWES, BERNARD DYER, THOMAS FAIRLEY, G. G. HENDERSON, W. R. E. HODGKINSON, E. GRANT HOOPER, WILLIAM MACNAB, GEORGE MCGOWAN, SIR ALEXANDER PEDLER, C.I.E., THOMAS PURDIE, SIR WILLIAM RAMSAY, K.C.B., H. DROOP RICHMOND, ALFRED SMETHAM, J. E. STEAD, F. W. STODDART, J. A. VOELCKER, AND W. G. WHIFFEN.

BUILDINGS COMMITTEE:

THE PRESIDENT*, WITH G. T. BEILBY, BERTRAM BLOUNT, CECIL H. CRIBB, OTTO HEHNER, C. A. HILL, DAVID HOWARD, GEORGE MCGOWAN, RAPHAEL MELDOLA, SIR ALEXANDER PEDLER, C.I.E., A. GORDON SALAMON, J. MILLAR THOMSON, AND JAMES WOODWARD.

SPECIAL COMMITTEE:

Re HONORARY CORRESPONDING SECRETARIES.

THE PRESIDENT*, M. O. FORSTER, PERCY F. FRANKLAND, DAVID HOWARD, A. LIVERSIDGE, WILLIAM MACNAB, SIR ALEXANDER PEDLER, C.I.E., H. DROOP RICHMOND, AND A. GORDON SALAMON.

LECTURES COMMITTEE:

THE PRESIDENT, LEONARD ARCHBUTT, G. T. BEILBY, BERTRAM BLOUNT, A. CHASTON CHAPMAN, H. G. COLMAN, C. F. CROSS, BERNARD DYER, M. O. FORSTER, PERCY F. FRANKLAND, OTTO HEHNER, HERBERT JACKSON*, H. R. LE SUEUR, GEORGE MCGOWAN, AND RAPHAEL MELDOLA.

SPECIAL REGULATIONS COMMITTEE:

Re CONFERENCE OF PROFESSORS.

THE PRESIDENT, G. T. BEILBY, A. CHASTON CHAPMAN, A. W. CROSSLEY, F. G. DONNAN, W. P. DREAPER, BERNARD DYER, M. O. FORSTER, G. J. FOWLER, PERCY F. FRANKLAND, A. G. GREEN, ARTHUR HARDEN, OTTO HEHNER, G. G. HENDERSON, W. R. E. HODGKINSON, G. T. HOLLOWAY, HERBERT JACKSON, C. A. KEANE, F. S. KIPPING, GEORGE MCGOWAN, RAPHAEL MELDOLA*, W. J. POPE, A. GORDON SALAMON, A. SMITH-ELLS, J. MILLAR THOMSON, SIR WILLIAM TILDEN, E. W. VOELCKER, EDMUND WHITE, AND W. PALMER WYNNE.

GLASS RESEARCH COMMITTEE:

THE PRESIDENT, BERTRAM BLOUNT, WALTER C. HANCOCK, OTTO HEHNER, HERBERT JACKSON, RAPHAEL MELDOLA*, AND THOMAS R. MERTON.

* CHAIRMAN.

† VICE-CHAIRMAN.

THIRTY-SEVENTH ANNUAL GENERAL MEETING.

MONDAY, MARCH 1st, 1915.

THE Thirty-seventh Annual General Meeting of the Institute of Chemistry of Great Britain and Ireland was held at the new premises of the Institute, 30, Russell Square, London, W.C., on Monday, March 1st, 1915, at 4.30 p.m.; Professor Raphael Meldola, President, in the Chair.

The minutes of the Thirty-sixth Annual General Meeting having been read and confirmed, Mr. A. Gordon Salamon, Honorary Treasurer, submitted the Financial Statements for the year 1914.

The Honorary Treasurer remarked that the year 1914 was an abnormal one financially in several respects. The main items had been noted in the Report of Council: the examination fees received were £483 less than in the previous year, but the Institute had received the proceeds of the Redemption Policies on the lease and laboratories at 30, Bloomsbury Square.

On the expenditure side there was an increase on the printing expenses and also an increase under the heading of Salaries and Wages, but a saving was effected by the discontinuance temporarily of the Lectures Scheme.

Of the proceeds of the Redemption Policies (£3,755) all except £200 was invested before the end of the year. Since then that sum and all Life Compositions and other fees usually allotted to the Reserve Fund had been duly invested by the purchase of stock from the Buildings Fund.

Referring to the Buildings Fund, the Honorary Treasurer stated that the contributions received during the year amounted to over £3,600. The Buildings Committee had endeavoured to keep as nearly as possible to the provisional sum allowed for the building and incidental expenses, but, having in view the substantial legacy which would accrue to the Institute under the will of the late Mr. Edward Riley, they had decided to put in hand at once

certain additional work—including the provision of a lift—which it was considered advisable to carry out while the building was in course of completion rather than at any future time. It would be necessary to draw temporarily from the Reserve Fund of the Institute, as authorised by the Institute at an Extraordinary General Meeting; but the Buildings Fund would remain open until the total sum had been derived from voluntary contributions, and it was hoped that—in more peaceful times—the Fellows would do what they could to make up the deficit. It would be difficult, at the present time, to give very exact figures, but, beyond the promises already received and the legacy referred to, probably less than a further £1,000 would be required for the completion of the whole scheme.

The Honorary Treasurer moved: "That the Statement of Accounts for the year 1914 be received and adopted, and that a vote of thanks be accorded to the Honorary Auditors for their services."

The motion was put from the Chair and carried unanimously.

Mr. Herbert F. Stephenson responded for the Honorary Auditors.

On the motion of Mr. David Howard, seconded by Mr. Thomas Fairley, the Report of the Council for 1914–1915 was received and adopted.

Mr. Howard expressed his opinion that the work of the Council during the past year clearly demonstrated the usefulness of the Institute to the country in many matters which had arisen since the outbreak of the war. Referring to the development of industries, he felt that the manufacturers were doing their best to cope with the situation and they would look to the Institute to supply qualified and competent chemists to help them in their difficulties.

Mr. Arthur J. Chapman and Dr. Stanley Walpole were appointed scrutineers to examine the voting papers for the election of Officers and Members of Council, and to report the result of the ballot for the election of Censors.

The meeting proceeded to appoint Auditors. It was moved from the Chair and resolved: "That Dr. Percy E. Spielmann and Mr. Herbert F. Stephenson be reappointed Honorary Auditors for the ensuing year." The vacancy caused by the retirement of Mr. W. J. A. Butterfield was filled by the election of Mr. Edward F. Harrison.

The President then delivered his address (see p. 9).

On the motion of Sir William Tilden, seconded by Professor J. Millar Thomson, a hearty vote of thanks was accorded the President for his Address, and he was asked to allow it to be printed in the Proceedings of the Institute.

Sir William Tilden said that the Address would be read with interest and advantage by the Members. He congratulated the President and the Institute on the acquisition of the new premises. Apart from serving the purposes of the Institute, it constituted a definite assurance to the public of the existence of a body of professional chemists other than pharmaceutical chemists. The facts and opinions advanced by the President with reference to the schemes for promoting the aniline dye industry in this country were invaluable. Sir William expressed the hope that the public would be roused from its neglect and disregard of science in its applications to useful and national purposes. The public appeared to be incapable of realising what a chemist—other than a pharmaceutical chemist—does. He deplored the fact that the profession was as yet unrepresented in Parliament.

Sir William also alluded to the proposed revision of the Regulations, which he considered a step in the right direction; he hoped the Institute would work in co-operation with the Universities and Technical Schools, meeting them as far as possible while safeguarding the present high standard of the requirements for membership.

Professor Thomson, in seconding the vote of thanks, acknowledged the distinguished services of the President, and mentioned especially his keen interest in the planning and details of the building.

Colonel Charles E. Cassal and Mr. F. J. Lloyd also spoke in support of the vote of thanks.

The following were elected Censors: Dr. G. T. Beilby, Professor Percy F. Frankland, Mr. David Howard, and Professor Raphael Meldola.

The Officers and Members of Council for the year ending March 1st, 1915, were also declared elected (see p. 2).

On the motion of Dr. M. O. Forster, seconded by Sir William Ramsay, a vote of thanks was accorded to the retiring President, Officers and Members of Council for their services.

The President having replied, the meeting was dissolved.

The Address of the Retiring President:

PROFESSOR RAPHAEL MELDOLA, D.Sc., LL.D., V.-P.R.S.

My first duty on the present occasion is to give expression to the pleasure which we must all feel in being able to hold this thirty-seventh Annual Meeting in our new headquarters. In welcoming you to these premises, I may be permitted to place upon record my own gratification at having been privileged to preside over the affairs of the Institute at this critical period of our history. We are, in fact, in the happy position of witnessing the consummation of an undertaking inaugurated in 1909 and now, after long deliberation and in face of many trials and much unavoidable delay, about to be brought to a successful issue. In congratulating the members of the Institute on the acquisition of a building worthy of the dignity and status of the profession to which we belong, I must again express the grateful thanks of the Council to all both within and without our own ranks who have by their contributions to the Building Fund made this work possible.

The preliminary work necessary for starting the building scheme was well advanced under the presidency of Prof. Frankland, and was carried on continuously by successive Councils and Committees under the presidency of my predecessor, Dr. Beilby, and during my own period of office. We are deeply indebted to those members of Committees who have so untiringly given their services to our cause—the Committees which have concerned themselves respectively with the raising of the Fund and with the erection of the building. Our thanks are no less due to the members of the Sub-Committees appointed for dealing with special details in both branches of the work. The Institute has been most fortunate in being able to bring to its aid such expert co-operation. Advantage of the present opportunity

may be taken also to make known to our Members the value of the services rendered by our architect, Sir John Burnet, whose co-operation throughout has been something much more intimate than that of a purely formal professional consultant. Not only has he provided us with a building well planned, well designed, harmonious with its environment and admirably adapted to our requirements, but from the beginning he has taken a personal interest in every detail of the work. With unfailing courtesy and patience, Sir John has applied himself to this somewhat exceptional task—a task demanding the highest ability and technical skill, restricted from extravagance by the Fund at our disposal and controlled by Committees often exacting in their criticisms. The success which has crowned his efforts will be obvious to you on your tour of inspection, whilst to me on the termination of my period of office it is a real pleasure to be enabled to place upon record my high appreciation of our architect's share in bringing about the materialisation of a scheme the development of which we have for the last five years been watching with feelings of anxiety and hope.

Passing now to the consideration of the Report of Council, it is satisfactory to note that our losses by death during the year have been fewer than usual. They include, however, several men of distinction, among whom I may mention Christopher Clarke Hutchinson, chemist, engineer and King's Counsel; Edward Riley, chemist and metallurgist, a pioneer in the acid and basic Bessemer processes; Sir Joseph Wilson Swan, chemist and physicist, who was well-known for his work in connection with photography and in the practical applications of electricity; Joseph William Thomas, chemist, naturalist and playwright, who did good work on coal-mine gases and in connection with the ventilation both of mines and public buildings; William Weston, for forty years Admiralty chemist; and, lastly, I would refer also to Fred Wright, an Associate, a young chemist of promise, who was killed while engaged in the service of his country, by an explosion at a picric acid works.

In mentioning the name of Edward Riley, I would remind you that the Institute will eventually receive, under the provisions of his will, a legacy of £1,000, a substantial help towards our Building Fund.

Fellows and Associates will see from the Report that, while the normal work of the Institute has been carried on with unabated activity, we have also been enabled to take a considerable part in public affairs coming within our purview as a body of professional chemists willing and anxious to render all possible service to our country and Empire during the present calamitous war. In the first place, I considered it appropriate that this Institute, incorporated by Royal Charter and an organisation having special relationships with Government Departments, should take an early opportunity of giving expression to its loyalty and of declaring its opinion as to the righteousness of the course taken by the Government. Such action on the part of a society of professional men might possibly have been regarded as an excursion beyond our legitimate province—a view for which there would have been justification had the conflict been limited to a struggle between the armed forces of the nations concerned. I may remind you, however, that a manifesto bearing the signatures of University Professors and the names of many scholars well known in the fields of Literature, Science and Art was issued from Germany denouncing our country in the strongest terms. Such a document appeared to me and to your Council to call for a reply. It would of course have been open to us—as to any kindred organisation—to frame a suitable repudiation; but since a British counter-manifesto had already been issued and extensively supported by our representative scientific and other scholars and public men, and as it would have been impossible to present our case with greater accuracy and comprehensiveness or in more dignified and moderate terms, we decided to adopt a resolution expressive of our concurrence with the views thus published. This resolution and the manifesto—the latter, I may add, mainly drawn up at Oxford—

were published in our Proceedings last November (Part IV., p. 8), and will, I am sure, receive your approbation and support on the present occasion.

Turning to other matters arising from the war, and having direct relationship to our subject and to our members, it is satisfactory to be able to report that both collectively and individually we have been enabled to render the State some service. Early in August, as appeared from a question raised in the House of Commons, it was foreseen that difficulties might arise in this country, and that certain industries—especially those connected with textiles—might be seriously affected through the stoppage of supplies of chemical products, more particularly dyestuffs, for which we were dependent to a preponderating extent upon German factories.

I may be pardoned on the present occasion if I venture to recall a warning which I sounded nearly thirty years ago. As far back as 1886, I foresaw that the coal-tar colour industry as conducted by us was doomed to decadence in this country. Systematic inquiries made among the consumers revealed the fact that even at that time 90 per cent. of the dyestuffs then in use here were of foreign manufacture. The paper in which these results were made known to the public was published by the Society of Arts, and is referred to in the History of this Institute (p. 10) as having been the last paper read before the Chemical Section of that Society. The voluminous newspaper correspondence which has been going on in connection with this subject all over the country during the last few months shows that, in military parlance, no lost ground has been regained: before the outbreak of the war we were still importing nine-tenths of our colouring matters from Germany and Switzerland. Since 1886, on every suitable occasion, I have been endeavouring to instil into the public mind the lesson that the development of this industry abroad has been due to the recognition and utilisation by manufacturers of the results of chemical research. To me, therefore, the crisis threatening our textile industries is no matter for surprise—it appears simply as a relationship of effect to cause. It is

generally supposed that the prophet who, justified by events, is enabled to say "I told you so" is privileged to regard himself with the greatest complacency. In the present case, the only feeling I am able to express is one of humiliation: it is absolutely painful that under the stress of circumstances our weakness should have been laid bare to all the nations—a weakness for which there can be found no justification in the plea that no alarm had been raised or that the supply of chemical talent in this country was inadequate.

The steps taken by the Institute and by its members to give support to the Government in dealing with this great question of chemical supplies have been recorded in our Proceedings (Part IV., p. 4). As you are aware, the President of the Board of Trade appointed early in August a Committee for the purpose of advising the Government with respect to the means of meeting the national requirements. The Lord Chancellor, Viscount Haldane, is Chairman of that Committee, and two of our Past-Presidents together with myself, your President-designate and three other Fellows of the Institute are members. From this main Committee there was subsequently formed a Sub-Committee for dealing especially with the manufacture of dyestuffs, under the Chairmanship of Lord Moulton, whose extensive experience in matters connected with this branch of applied chemistry is well known to us here.

It is now public knowledge that a scheme formulated by the Government in consultation with a Committee representative of the great dye-using organisations was put forward at the close of last year, and after full discussion by those immediately concerned was finally referred back for modification. This is not the occasion for entering into a detailed analysis of the various grounds on which the scheme was considered unsatisfactory, but the Government has determined—as I think, wisely—not to allow the project to fall through, and has now launched a new scheme which differs from the first in certain important particulars. Whether this new scheme will materialise remains to be seen: so far, all that can be said is that a

considerable number of the dye-consuming companies appear to be favourably disposed towards it. It would be out of place here to attempt to explain or to criticise the scheme as it stands, but I want it to be clearly understood, as there has been much public misapprehension on this point, that for neither of these schemes is the Board of Trade Advisory Committee or the Dyestuffs Sub-Committee in any way responsible. At the time of writing this sentence, we have no "official" knowledge of the new scheme. The grounds on which it was considered that public action was imperatively called for were set forth most clearly in an address delivered by Lord Moulton at Manchester, on December 8th of last year, and in that address he stated explicitly that he only held himself responsible for the advice that the Government should take action, but not for the particular shape or form which that action should assume. Out of the present situation, therefore, there arise certain general considerations which the chemical profession will do well to take note of, and for this reason I will venture to direct your attention to some of them.

In the first place, stating the case baldly, and in the broadest possible terms, the principle is adopted that there should be established a company, in which the consumers should be the chief shareholders, and which the Government should subsidise by advancing capital at a certain rate of interest to the extent of £1,000,000. It is unnecessary to go into details, but it will be seen that the scheme is in a way a co-operative one and that, for the first time, we have a distinct proposal in this country for the establishment of a State-aided industry. It is beyond our province to discuss this proposal in its economic or political bearings. In view of the great interests at stake, the policy appears to me to be a sound one, as was admitted by both political parties when the proposal was mentioned in the House of Commons last November by the President of the Board of Trade (*Times* report, November 28th, 1914). What concerns us most as representatives of the chemical profession is that our aspect of this great industry should be kept well to the fore in the present

scheme, or in any other scheme that may hereafter be put forward.

In the next place, I take it for granted that we all desire to see the restoration of the coal-tar colour industry to this country and, be it noted, not only restored, but permanently retained after the war. Now, the discussions of the Government schemes in various parts of the country by dye-consuming organisations, Chambers of Commerce, and so forth, have all centred round political or economic questions; that which is to us the vital principle, viz., adequate chemical control, has been subordinated or left out of consideration altogether. It is the old, old story—we wrangle over the question as to the method by which the industry shall be established and maintained here, whether by Free Trade or Protection, or Subvention or by any other device, and we leave out of consideration the question whether a few years hence there will be anything in the way of dyestuffs worth protecting; whether there will be a sufficient basis of material products left for the politicians and economists and business people to wrangle over. It is not a purely business problem which the Government has undertaken to solve; it is primarily a chemical problem. It is not even a business problem in the ordinary trade sense, because the main object is at first to supply our own wants and the chief consumers are to be the chief producers. The question of business in the sense of export trade is at present remote.

The conditions which have to be met if we wish to see this country once more the home of the colour industry may be well known to us here, but are certainly imperfectly understood by the public. Even those most concerned—those who are invited to subscribe the capital—appear in most cases to have an idea that all that is necessary is to find the money, secure the Government aid, appoint a Board of business Directors, and lo! the industry will forthwith spring into existence ready to cope with all emergencies. Now, what are the facts of the case? About five hundred different dyestuffs of definite composition have been given to tinctorial

industry as the products of chemical research. Of these, a certain number only can be and are being made in this country, the total output of our factories being at present inadequate for the requirements of our textile industries. The first step to be taken, therefore, is to enlarge and develop our existing factories so that the dyes which can be made here should be turned out in larger quantities. This necessity has, of course, been provided for in the Government scheme, and "so far so good." Moreover, if the extension of the existing factories still leaves us with insufficient supplies, new factories must be erected and equipped. That also is provided for in the scheme; but if we want to establish the industry here permanently we must look beyond all this—where shall we be left after the war? We shall be in possession of processes for making a certain number of dyes, and the supply of this particular set of products may possibly be sufficient for the particular purposes for which they are required. Let us label these provisionally "staple products." But there will still be an outstanding number—probably a majority—of other products which we have never yet made here, and for the working out of these processes no combination of "business" talent is of the slightest value. I repeat, it is not a business question, but a chemical question, and it is by chemical research alone that our colour industry can be saved in the long run. Consider the leeway that we have to make up. The German colour industry has been built up by the utilisation of the results of research carried on in the factories and universities and technical schools for a period of over forty years! To suppose that we can retrieve our position after forty years of neglect by starting a company the directorate of which is to consist solely of business people is simply ludicrous. It was against this principle that I ventured to raise my voice in the *Times* of January 20th, and I am extremely glad to find that not only the chemical and technical worlds, but the large and representative body of dye users and producers which form the Dyewares Supply Enquiry Committee of the Society of Dyers and Colourists fully endorse this

view and have forwarded to the Board of Trade a resolution, passed at Manchester last month, in support thereof. A meeting of the Federation of the Light Leather Trades held at the Leathersellers' Hall on February 22nd passed a similar resolution. It is satisfactory to learn that there are at any rate some of the dye-consuming organisations which have grasped the situation scientifically. To imagine that a dyer, however skilful he may be, is by virtue of his occupation necessarily competent to direct the affairs of a company which is concerned with the manufacture of the dyes which he uses, is about as sensible as the assumption that a person who can tell the time by his watch is thereby qualified to undertake the direction of a factory for the construction of chronometers.

One feature of the new scheme which the chemical profession will view with favour is the distinct recognition of research as a necessity for the development of the industry. The Government "will, for ten years, grant not more than £100,000 for experimental and laboratory work." That, although an inadequate endowment, is certainly a concession which marks an advance in official opinion for which we are grateful. It will be for the satirist of the future to point out that it required a European war of unparalleled magnitude to bring about this official recognition of the bearing of science upon industry. It would be but a truism to state here the purposes for which research is required; the question we have to raise is—Who is to direct this research? A directorate of purely business people would certainly be incompetent; a board composed of dye users could do no more than indicate what dyestuffs were needed. True, it is proposed that the company should take powers to secure the assistance of a committee of experts, but this appears to me to be simply a reversion to that policy of "drift" which I have for so long been struggling to overthrow. The experts are, as usual in this country, subordinated; their assistance is to be invoked at the discretion of a Board the members of which can have no real knowledge of the conditions necessary for producing the materials they require

now—still less would they be competent to point out dangers ahead. The “ staple products ” upon which they are asked to stake their capital may a few years hence be superseded by the products of subsequent discovery. The policy of attempting to run a highly specialised and rapidly developing branch of organic chemical industry by a company of business people with expert assistance when required is fatal if we want to establish the industry permanently here. The group of industries which have arisen from the products of the tar-still are not going to remain stagnant after the war, and it is scientific guidance and not mere assistance that will keep them alive. It is the expert, and the expert only, who can foresee the course of development ; who can keep in touch with the progress of research, and who can direct with intelligence the campaign against our competitors. If such scientific direction is withheld, all schemes are sooner or later bound to end in failure. I deliver my second warning to a new generation after an interval of about thirty years : if it is again unheeded, so much the worse for the country !

To other branches of manufacture in which our dependence upon foreign products has been forcibly revealed by the war we have also been enabled to render considerable service. It has long been known to us all here that the main part of our laboratory equipment in the way of glass and porcelain apparatus and filter-paper has been supplied from abroad, and that large quantities of pure chemical reagents and of the special chemicals required for analytical or research work have borne non-British labels. This state of affairs called also for prompt action, and, as already reported, the Councils of the Institute and of the Society of Public Analysts have acted conjointly as a Committee for dealing with this matter of such vital importance to our profession. The inquiries instituted by this Committee soon brought out the fact that failure in the supply of laboratory glass apparatus would not only cripple our own work, but would also influence to a serious extent certain important industries the dependence of which

upon supplies of suitable glass had not at first been foreseen. In connection with these inquiries, it was at a later period considered necessary, in view of the great national interests involved, that the Institute should take part in giving practical aid to would-be manufacturers. For this purpose, the Glass Research Committee referred to in the Council Report was appointed, and is still carrying on its work. Specimens of approved glass have been obtained and analysed, and experimental melts based upon these analyses and upon formulas supplied by members of the Committee have been made in our laboratory and submitted to the recognised tests. Our experiments have perforce been carried out on a small scale, but the co-operation of a firm of glass manufacturers has been secured, and our results will be tested on a fairly large scale under complete expert control. The Institute is deeply indebted to the members of this Committee: Prof. Jackson, Mr. Otto Helner, Mr. Bertram Blount, and Mr. Merton, as well as to Mr. Hancock, our executive member. Not the least important of the glass problems is the production of a suitable glass for miners' safety lamps, the necessary protecting shades for which have also been hitherto mainly imported from abroad. This particular kind of glass is of national importance in relation to coal-mining, and it is certainly humiliating to learn from the makers of these lamps that for glass of the required quality, capable of complying with the Home Office tests, we have been so largely dependent upon foreign glass manufacturers. We have felt it a duty, therefore, to extend the work of the Research Committee in this direction, and a glass of great promise has recently been prepared from a formula based on analyses of an approved specimen. We shall, it is hoped, be shortly in a position to have some of this glass made on a sufficiently large scale to supply lamp shades for submitting to the required tests. It will, of course, be understood that the action of the Institute throughout has been governed entirely by patriotic motives; the work is being carried on as a national duty, and our results have been and will continue to be placed unreservedly at the dis-

posal of all manufacturers who wish to avail themselves of them. A full report of the work carried out by our Glass Research Committee will be published in due course. Reviewing the position generally, I am justified in stating that the efforts which are being made by certain firms, as well as by our own Committee, are leading to results which hold out a good prospect of our being able to establish the manufacture of many kinds of chemical glassware upon a permanent footing in this country, and that at no distant future we shall be able to see our laboratories stocked with home-made apparatus. With respect to porcelain it is satisfactory to be enabled to report that crucibles and dishes equal to the best Berlin ware are now being produced in this country, and at practically the same price. It is equally gratifying to know that the filter-paper problem has also been practically solved—thanks largely to the assistance given by our paper experts—and that British filter-papers of all the required qualities, and in most respects equal to those which we have been accustomed to associate with foreign labels, are being manufactured in British mills.

With respect to the supplies of chemical reagents, the Joint Committee found it necessary to entrust to a special Sub-Committee the somewhat arduous task of compiling a list of all the commonly used reagents with indications of the standards of purity required and the tests necessary for ascertaining whether the required standard had been reached. We are much indebted to the members of the Sub-Committee who so willingly carried out this tedious piece of work. The list has been published as a pamphlet, and has been sent to many firms and companies of manufacturing chemists with a view to ascertaining which reagents of their own manufacture they are prepared to supply. When the replies have been received we shall know more precisely how far the requirements of our profession can be met by British manufacturers.

In all the branches of work carried on by the Joint Committee we have received most cordial assistance from manu-

facturers and dealers, and I am glad of the present opportunity of acknowledging their co-operation. The manufacturers of chemical reagents are, I know, doing their best to meet the needs of our profession. It is to be most earnestly hoped that sooner or later our laboratory supplies both of apparatus and materials will be entirely of British origin. In helping to bring about this much-desired result it is necessary, however, to remind you that we also have our part to play. The manufacturers are—in some cases, at considerable cost—developing lines of industry which are of the nature of new departures for this country. I cannot too strongly urge upon you that it is the solemn duty of consumers and users—in fact, of every branch of our profession—to do their utmost to encourage and support these new home industries. I do not refer simply to the present crisis when we are perforce restricted in our sources of supply, but patriotism and the credit of our country alike demand that, after the war, we should help those who are helping us by insisting upon having in our laboratories nothing but the products of British manufacture. Our aim should be not only to assist in the development of these industries now, but to insure their permanent retention after the declaration of peace. With the achievement of this result there would be removed the reproach that the nation which gave to chemical science Priestley, Black, Boyle, Cavendish, Davy, Dalton, Faraday and Graham—the country which founded the coal-tar colour industry and which has taken the lead in the manufacture of “heavy chemicals”—should allow her laboratory work to be made dependent upon foreign materials, and her great textile and metallurgical industries to be threatened through the stoppage of supplies from inimical countries.

In addition to such action as we have taken in our corporate capacity through the Council, we have also to give expression to our high appreciation of the honourable part which is being taken in the campaign by those of our Fellows, Associates and Students who have for the time being relinquished their

professional work or their studies in order to give their services to the country in the field of war. The roll of those thus serving in the Navy or the Army, or in the Territorial Force, has already been published in the Proceedings. The list is still far from being complete, but it will be kept up to date as the names are received so that we may ultimately have a complete record of those on active service. It is of interest also to our profession to learn that during the present campaign and, so far as I am aware, for the first time on active service, a mobile chemical laboratory mounted on a 40-h.p. motor has been in use at the front. Professional chemists are likewise serving with the Army Service Corps and with the Sanitation Companies of the Royal Army Medical Corps. Some of our members are being made use of in laboratories and factories under Government control and concerned with the testing or production of the various war materials and supplies. The Institute, in brief, has done its best in the present emergency to discharge its functions as a national professional organisation.

The Government departments early in August received intimation that the services of our technical experts and the accommodation of the Institute's laboratories were at the disposal of the Government if needed, and the names of many of our members have been included in Government and other Committees which are carrying on work of supreme importance to the welfare of the nation at the present time. It may be remembered that last year I had occasion to call attention to the importance of chemistry and of chemists in warfare. Little could it have been foreseen how soon this statement was to receive practical demonstration in this country. If it is permissible to look ahead, it may reasonably be conjectured that one effect of the war will be an increase of activity in our profession and a continually growing demand for competent chemists for our factories. That there is justification for this view is proved by the activity of our office and the demands upon our Appointments Register during the past few months. It may therefore be fairly anticipated that on the conclusion of peace there may be some kind of chemical

revival in this country. The results of neglect have certainly been brought home to us in a very forcible way ; it will be for the Institute to see that the national requirements are met by chemists of the highest training.

This last consideration leads naturally to another branch of our work in which, as you know, I have taken particular interest. The Special Regulations Committee referred to in my address last year has given most serious consideration to the matters referred to it by the Council. The stage which has been reached is indicated in the Council Report now in your hands. As the practical outcome of the Conference of Professors and Teachers held in 1913, the grounds on which it was deemed necessary to reconsider the Regulations for admission to the Institute now in force were somewhat fully set forth last year. The principle which has to be kept in view, and which will, I hope, be steadily upheld by my successors, is that of making the Institute more and more representative of the whole profession in every one of its branches. This can only be done by adopting the policy of "looking ahead." I have already pointed out that we were not enrolling the coming generation of chemical workers to the full extent that is desirable in order to achieve this purpose. Many reasons assigned in the course of the discussions at the Conference of 1913 still appear to me quite valid. Personally, I sympathise with the University graduate who, having spent three or four years in training for our profession, and having passed the University examinations, objects to the ordeal of having to submit himself to yet another examination before he can become an Associate. It is the existence of this Regulation which has led so many University graduates to ask : What is the use of the Institute ? Of what gain is it if I can add A.I.C. to my B.Sc. Honours in Chemistry ? The general outcome of the Conference of 1913 appeared therefore to be that, as one important step—perhaps the most important—towards the realisation of the ideal all-comprising Institute of the future, it would be desirable to

meet the University graduate at the close of his educational career and to give him the opportunity of joining our ranks without imposing an additional examination. This is the problem which the Special Regulations Committee has attempted to solve, and you will admit that the task has by no means been an easy one. I hope we have succeeded ; I think we have : but, although the power of formulating Regulations is, under our Charter, vested entirely in the Council, we have thought it desirable in a case of such far-reaching importance to take steps for ascertaining the views and taking into consideration the opinions of our members as a whole. There may be one or two technical legal points to deal with in order to ascertain whether the new Regulations are conformable with our Charter. If we are advised that the proposed modifications do not contravene the spirit of the Charter, an Extraordinary General Meeting of the Institute will be convened for the purpose of giving an opportunity for such expression of opinion.

Assuming that the new Regulations are found acceptable in principle if not in detail, I will venture now to point out some of the difficulties which we have had to surmount and some of the consequences which would follow from the change. We had in the first place to insure the maintenance of the standard of efficiency imposed by the Institute, and we had, in the next place, to safeguard the position of existing Fellows and Associates. As regards the first point, the new Regulations if adopted would, if anything, raise the standard. We abolish one examination for a University graduate, but we impose an additional year of training. Moreover, the examination which gives the graduate his degree must, under the assessorship scheme, be of such a standard as in the judgment of the Assessor would be satisfactory from the Institute point of view. Carried out in the spirit in which the scheme has been accepted by the Council, there will be no lowering of the standard of Associateship, but, with the lapse of time, I am of opinion that the University training and the requirements of the Institute will become more and more blended ; there will be action and reaction to the mutual

benefit of both the cause of chemical education and the status of the chemical profession. Our existing members will find themselves attached to an Institute growing stronger in number and prestige, the Fellowship of which will become enhanced in value as a professional qualification.

Certain minor points arising from the proposed modifications have yet to be dealt with by the Special Committee, but the major principle must obviously be disposed of in the first place. The Institute may, under the new scheme, be recruited from two sources: from the ranks of "assessed" University graduates, or from University or non-University students whose examination is not assessed but who, having complied with the conditions imposed, elect to enter the Institute by submission to the test of our own examination. It will be noticed, also, that the tendency of the new Regulations is to make the Fellowship a higher and more distinctly professional qualification by giving greater recognition to the principle of specialisation based on a thorough general training. While the Associateship will be regarded as heretofore as a guarantee of sound general training, the Fellowship will become a hall-mark of the highest efficiency as an actual practitioner in one or another of those branches of our profession which bring the practising chemist into contact with the public as a consultant or analyst, or with manufacturers as a technologist. We shall, in fact, by this organisation fall more closely into line with the engineering profession, which for some time has organised its professional forces in a similar way. With the adoption of the new Regulations there would disappear the criticism, urged by some speakers at the Conference, that our examinations are duplicating the University examinations. We propose under the new scheme to accept the University examination as our own examination, subject to the conditions specified. It remains now for the Universities to co-operate with the Institute, and, as a further necessary step in this direction, may I again take this opportunity of expressing the hope that those few professors and heads of chemical departments who are not now Fellows

will help the cause of their profession by joining our ranks and co-operating with us in the work of consolidating the profession.

Arising from the work of the Special Regulations Committee, the Council, being mindful of the difficulty of obtaining the necessary training by students in certain important centres inconveniently situated with respect to University attendance, have referred to the Institutions Committee for consideration the advisability of making additions to the list of Institutions already recognised by us as giving courses of training adequate to our requirements for the Associateship. The East London College, which is affiliated with the University of London, has been added to the list during the year, and several other important London and provincial colleges will be inspected and reported upon in the near future with a similar object in view.

I am glad to be able to state that during the past year the Censors have been called upon to investigate a smaller number of complaints. The few cases dealt with have, however, been received in a most conciliatory spirit, although, in certain instances, some difficulty may have been experienced in removing the cause of complaint. It is perhaps scarcely necessary to point out that the higher the status of the professional chemist the more careful should he be to avoid lending his name for advertising purposes. The publication of certificates containing vague, laudatory and irrelevant statements vouching for the specific efficacy of a particular article for purposes concerning which the chemist, as such, has no special qualification entitling him to make a public recommendation is much to be deplored. This practice not only brings discredit to our profession, but it is a source of reproach to the individual who sanctions it and sets a most dangerous example for our younger members at the outset of their career.

Passing now to the general affairs of the Institute, it will

be noticed that as a result of the war there has been a considerable falling off in the number of students and of candidates for our examinations. The effect of this diminution upon our finances is referred to in the Report, and we can only express the hope that normal conditions will be restored when the present troubles are over. We are fortunate—as we always have been—in securing the assistance of such an effective body of Examiners. Several of these, having completed their term of office, are now retiring and, in expressing regret at the loss of their services, the Council have placed upon record their appreciation of the excellent work which they have done on our behalf. The vacancies so caused have already been filled by the Council, and you may rest assured that under the new Board of Examiners the entry to the Institute will be as well safeguarded as heretofore.

The Council regret that under existing circumstances it has been considered advisable to suspend for the present the lecture scheme which was inaugurated during the presidency of my predecessor, Dr. Beilby. By a remarkable coincidence the last lectures, by Mr. William Macnab, dealt with explosives, a subject of special importance at the present time. This monograph has been much appreciated by our members and students as a valuable addition to our set of publications. I am, it is needless to say, in absolute agreement with my predecessor as to the educational value of this part of the Institute's work. Nothing can be more advantageous to our students and junior members than to be given an insight into the practical bearing of their science upon specialised lines of work. The exposition of methods and results by such expert practitioners as we have been enabled to enlist in the cause cannot but impart a living reality to chemical work, such as is unobtainable in the usual curricula of training in which the broad and general foundations have necessarily to receive the first consideration. For the present, as so many of our young men are otherwise employed, the lecture scheme must remain in abeyance: when conditions appear to warrant its revival

it will, I hope, be again brought into operation and firmly established as an integral part of our work.

While dealing with the subject of publications I should like to refer to the "History of the Institute," upon the issue of which, in July of last year, we may certainly congratulate ourselves. No more appropriate occasion could have been chosen than the present, when we enter upon a new career in a building of our own. It was generally recognised that the time had arrived for placing upon record in a concise form, as a matter of permanent interest to our present and future members, the history of the foundation and development of the Institute. The labour of compiling this most useful volume has fallen mainly upon our Registrar, and the work has had the advantage of the editorship of Mr. E. W. Voelcker and the help and advice of other Fellows conversant with various periods. To all who have assisted by supplying material, or by reading the proofs, we desire to return our cordial thanks. I may remind you that a wish has been expressed for the issue of a superior edition printed on paper of better quality, but the publication of this edition depends upon our being able to secure the necessary number of subscribers.

A general survey of the work of the Institute during the last three years warrants the statement that in every branch of our activities there has been marked progress. It has been a critical period in our history and our labours have been strenuous, not only along all the old lines, but in many new directions. The list of enrolments during the period referred to shows that, in spite of recent troubles, there has been steady growth:—

Year.			Fellows.	Associates.	Students.
1915	..	..	1,227	250	363
1914	..	..	1,204	250	365
1913	..	..	1,172	248	333
1912	..	..	1,151	224	331

Notwithstanding the loss by death of forty-three Members during the same period, the above figures show an increase of 102 Members, which is exactly the same as the increase for the previous triennial period. In spite of the war, the aggregate number of candidates for our examinations has been well maintained, the figures for the first two years showing a considerable advance on previous records, and the total for the full triennial period is twenty-three beyond that of the previous three years :—

Year.			Entries.	
1914—1915	92
1913—1914	158
1912—1913	161
1911—1912	135
1910—1911	129
1909—1910	124

A noteworthy feature of the period under review has been the increased efforts made by our members, through our organisation, to advance their claims to that enhanced recognition to which they are entitled as a body of professional men. Much time has been devoted to the affairs of Public Analysts, whose duties have become increasingly onerous without a corresponding increase of appreciation on the part of the public authorities which they serve. The conference on the general question of the remuneration and conditions of official chemical appointments held in 1912 led to a useful discussion on the question of scales of fees and to the preparation of a statement on the conditions of appointment of Public Analysts. This statement, which sets forth in a concise form the case on behalf of this body of public officials, has been circulated among county and municipal authorities, and will be presented in due course to the Government Departments concerned. It must be recognised that, under the existing conditions of extraordinary strain upon all the State officials, the further pressing of our claim would just now be inopportune. We are, I am sure, all agreed that at the present critical time individual interests must give way to national requirements.

I may remind you that among other steps that have been taken in the same direction we have been enabled to lay our case before the Royal Commissions on the Civil Service, both at home and in India. Whether our representations will bring about any amelioration in the conditions of chemical appointments under the Government must for the present remain an open question ; certainly no immediate result can be looked for, but, so far as our power goes, we have done all that is at present possible in the interest of our members. Further efforts may be necessary in the future, and the Institute will, I am confident, not fail in this line of policy. It is only by persistent attack that we may hope to see improvements effected—attack not only by direct appeal to the Departments concerned, but also by our taking advantage of every opportunity of educating public opinion as to the value of our science and our profession to the public welfare. Perhaps no more glaring example of the official view of the status of the chemist has ever been proclaimed than the advertisement recently issued by the Chief Inspector of the Royal Arsenal, Woolwich. Applications are invited for the post of Temporary Assistant Chemists, the candidates being expected to have had a thorough training in Inorganic and Organic Chemistry, and to be accurate analysts. Preference is to be given to University Graduates and to members of this Institute, and for this combination of qualifications there is offered a “wage” of £2 os. 6d. per week! A more direct discouragement to entry into the chemical profession or a more certain method of securing incompetence for the public service can scarcely be imagined. Sir William Tilden has called attention to this advertisement in the *Times*, and a question was asked about it in the House of Commons ; but it is clear, from this flagrant illustration, that strong representations on behalf of our profession will have to be made by the Institute in official quarters when normal conditions are restored in this country. It is particularly unfortunate that such degrading terms should have been offered at a time when the nation’s need for skilled chemists is being made manifest from so many different

quarters, and when this necessity is just beginning to be recognised by some of the Government Departments.

In vacating the Presidential Chair, which it has been my privilege to occupy during the last three years, it may be permissible to express the hope that the policy of adaptation to changed conditions in the educational world which will be inaugurated by the adoption of the new Regulations will insure for the Institute ever increasing recognition as the authoritative central organisation for the whole body of professional chemists of the Empire. We must look forward to a time—I hope, at no distant future—when every chemist entering our profession will be led to realise that he can no more afford to be absent from our Register than can the medical practitioner allow his name to be absent from the Medical Register. I expressed this hope at the beginning of my term of office, and I venture to repeat it at the close. We want all the professors and teachers of every grade ; we want the analysts and consultants, and we want the technologists. There are many distinguished names yet absent from our list, and if, as may be justly urged, certain men of established position can add no further prestige to their reputation by joining our ranks, I would earnestly plead that loyalty to their profession and the wish to see the practising chemists receive more and more public recognition in the future should act as incentives. The time is opportune for recruiting, and the opportunity is afforded to me now for playing the part of a recruiting agent. Never before in the whole course of our national existence has the dependence of our industries upon the highest applications of chemical science been more forcibly brought home to this country. It may be reasonably anticipated that the services of chemists will, as a result, be more and more in demand, and the standard of efficiency raised : it will be realised that nothing short of that complete training insisted upon by this Institute will make for success, and our hall-mark of membership should become the generally recognised stamp of competency. Such, at any rate, is the dream which I have indulged in during my occupancy of this Chair, and its realisation may confidently be left to those who succeed me.

When three years ago I accepted the invitation of the Council to be nominated for the Presidency I had serious misgivings as to whether, in view of my duties in many other directions, it would have been possible for me to devote adequate attention to your affairs. I am thankful, however, that I have been enabled to discharge my obligations, and I have striven, to the best of my ability, to carry on and extend the work of my predecessors in office. It will be for the future historian of the Institute—in that supplementary volume which we may ask our Registrar to compile some years hence—to appraise the effects of my efforts on your behalf. Whatever I have been enabled to accomplish has been largely due to the loyal support which I have received from the Honorary Treasurer, from the Vice-Presidents, and Members of Council and of Committees, and to the unremitting zeal of our Registrar, Mr. Pilcher. To all those who have worked with me during what may be fairly claimed as one of the most active periods of our existence, I desire to return my grateful thanks. I shall always look back with pleasure upon the opportunities which have been afforded to me for making new and valued friendships and for gaining a deeper insight into the constitution and requirements of the chemical profession. That I have fully realised the important part which the Institute has played in the past, and is destined to play to a still greater extent in the future, is, I hope, sufficiently vouched for by the attendance register.

In the person of Sir James Dobbie, whose election as my successor I expect shortly to be able to announce, you will have as President not only a distinguished chemist who has taken the keenest interest in our affairs, but an administrator of well-known ability. He is a man held in high estimation in every branch of our profession, and his public services as head of the Government Laboratory have recently brought him well-merited distinction. My own interest in your affairs will not slacken with my retirement, and I have every confidence that under his leadership unabated progress will be maintained. I heartily wish him and, through him, the Institute continued prosperity.

Proceedings of the Council.

FEBRUARY—MARCH, 1915.

Buildings Fund.—The present position of the Buildings Fund is summarised on p. 50. The Council have much pleasure in reporting that a donation of £500 has been received from an anonymous friend for the panelling and better finishing of the Council Room.

Appointment of Committees.—The Council elected at the Annual General Meeting held their first meeting on March 12th, and appointed the Standing and Special Committees with their respective Chairmen (pp. 4-5).

Vacancy on the Council.—Mr. S. O. Richmond having been obliged, owing to pressure of official work, to resign his seat on the Council, the vacancy thus caused has been filled by the election of Mr. George Embrey.

Appointment of Examiners.—The Council have appointed the following Examiners in the place of those whose term of office expired on March 1st :—

Intermediate Examination :

Dr. Harold Govett Colman, M.Sc., *vice* Mr. Alfred Chaston Chapman.

Final Examination :

Mineral Chemistry... Mr. George Nevill Huntly, B.Sc., A.R.C.S.,
vice Professor Herbert Jackson.

Metallurgical Chemistry ... Dr. Cecil Henry Desch, *vice* Mr. George
Thomas Holloway, A.R.C.S.

Physical Chemistry ... Professor Frederick George Donnan,
M.A., Ph.D., F.R.S., *vice* Professor
Alexander Findlay, M.A., D.Sc., Ph.D.

Chemistry (and Microscopy)
of Food and Drugs, Fer-
tilisers and Feeding Stuffs,
Soils and Water. Dr. Bernard Dyer, *vice* Mr. Percy Andrew
Ellis Richards.

Glass Research.—The Council have published a short report summarising the work of the Glass Research Committee appointed in October last to conduct investigations with a view to arriving at suitable formulas to be

freely available to manufacturers willing to assist in maintaining the continued supply of laboratory glassware. The importance of this work to numerous industries, particularly those concerned with the production of war material, will be apparent.

The Committee consisted of Prof. Raphael Meldola (then President of the Institute), Mr. Bertram Blount, Mr. Otto Helmer, Prof. Herbert Jackson, Mr. Walter C. Hancock, and Mr. T. R. Merton. At their first meeting Prof. Herbert Jackson reported that, in conjunction with Mr. T. R. Merton, he had already commenced experiments at King's College, London, with a similar object in view, and that he and his collaborator were prepared to give the Committee the results of their work up to that date and to pursue investigations on lines to be determined from time to time by the Committee.

Since then the research has been continued uninterruptedly, the chief aims being: (i.) to produce working formulas for all glasses used in laboratory work, and (ii.) to ascertain the influence of various ingredients on the physical and chemical properties of glasses. The work was extended to include glass for miners' lamp glasses, at the suggestion of the Home Office; and also glass for ampoules, to meet the needs of wholesale pharmaceutical chemists engaged in the production of Army Medical requirements. The Committee have also examined and reported on samples of British and French laboratory glassware, produced since the beginning of the war, a number of the specimens being made from formulas similar to, and in some cases almost identical with, those recommended by the Committee.

The Committee have had before them many specimens of glasses used for various purposes, of which analyses have been made by Mr. Blount, Mr. Hancock, and Mr. Helmer. It has been found, however, that mixtures prepared in accordance with the analytical results were not always satisfactory; but the analyses were helpful in suggesting synthetic experiments, and during recent investigations some intricate

analyses made by Mr. Gilbert J. Alderton under the supervision of Mr. Blount have proved especially valuable. Apart from the analyses, the work has been almost entirely carried on at King's College by Prof. Jackson and Mr. Merton, and by the former at his own house. The work has involved a careful study of the chemistry of silicates, aluminates, borates, etc., in their relation to the manufacture of glasses. A detailed report of these experiments will be published in due course.

Up to the present time, the Research Committee have reported eleven formulas for glasses for various purposes based on the results of about 400 experimental melts on a scale large enough for drawing rods and blowing small vessels. In addition, a very great number of experiments have been made in order to study the influence of the various constituents employed. No formula has been issued without submitting the specimens made to rigorous tests to prove their suitability for the purposes for which they are intended. Moreover, by varying the experimental working conditions, it can be said with reasonable confidence that the mixtures will prove equally satisfactory under the actual working conditions of a glass furnace. The question of workable temperatures has been carefully considered and, so far as it is possible to judge, the melts on a small scale indicate that even better results will be obtained on the industrial scale. This view has been justified by the samples already received from manufacturers who have tried some of the formulas.

In deciding the formulas it has been found necessary to pay special attention to the proportions of basic and acidic substances in respect of the action of glass mixtures on clay crucibles during fusion, and it has been shown by careful investigation that the formulas proposed give melts in which the influence of the ingredients of the crucibles is very slight and in some cases practically inappreciable.

The following formulas have been communicated to a number of manufacturers who have expressed their interest in the progress of the investigation and to scientific workers who are conducting similar experiments.

Soft Glasses, suitable for ordinary chemical laboratory ware :—

	Parts.	
(1) Sand	67.0	A soft glass which does not give up alkali readily to water, works well in the blowpipe and does not devitrify readily.
Sodium carbonate		
(Na_2CO_3)	34.2	
Calcium carbonate	11.6	
Alumina (Al_2O_3)	6.5	
(2) Sand	67.0	A soft glass of higher quality. Does not give up alkali under severe tests. A kindly working glass before the blowpipe, and very difficult to devitrify.
Sodium carbonate		
(Na_2CO_3)	29.0	
Calcium carbonate	9.6	
Calcium fluoride	1.6	
Alumina (Al_2O_3)	8.3	
Boric anhydride		
(B_2O_3)	2.0	

A Resistant Glass suitable for Pharmaceutical purposes, Ampoules, etc. :—

	Parts.	
(3) Sand	67.0	This glass is intermediate in hardness between soft glass and combustion tubing, is highly resistant to chemical action, withstands changes of temperature well, and should be a very suitable glass for high class beakers, flasks, etc.
Alumina (Al_2O_3)	10.0	
Calcium carbonate	12.5	
Magnesia	0.5	
Potassium nitrate	1.0	
Sodium carbonate		
(Na_2CO_3)	17.0	
Boric anhydride		
(B_2O_3)	8.0	

Glasses for Combustion Tubing :—

	Parts.	
(4) Sand	68.2	This glass resembles Jena combustion tubing very closely indeed. It has practically the same fusing point. It fuses on to Jena glass perfectly, and is indistinguishable from it before the blowpipe and in its behaviour on prolonged heating below its fusing point. The presence of the small quantity of calcium fluoride facilitates the incorporation of the ingredients. The sodium carbonate can be reduced to 1.34 parts provided 7.93 parts of anhydrous borax be used in the place of boric anhydride.
Alumina (Al_2O_3)	6.2	
Barium carbonate	8.8	
Calcium carbonate	13.0	
Potassium nitrate	4.3	
Sodium carbonate		
(Na_2CO_3)	5.5	
Boric anhydride		
(B_2O_3)	5.5	
Calcium fluoride	1.0	

	Parts.
(5) Sand	68.2
Alumina (Al_2O_3)	6.2
Barium carbonate	8.8
Calcium carbonate	14.2
Potassium nitrate	4.3
Sodium carbonate (Na_2CO_3) ...	5.5
Boric anhydride (B_2O_3) ...	5.5

This glass is practically of the same composition as (4). It is not so easy to make or to work, but it does not become so opaque as Jena combustion tubing on prolonged heating. As in No. (4), the proportions given for sodium carbonate and anhydrous borax can be substituted for the figures for sodium carbonate and boric anhydride.

Miners' Lamp Glasses :—

	Parts.
(6) Sand	65.0
Alumina (Al_2O_3)	1.0
Calcium carbonate	0.6
Arsenious oxide (As_2O_3) ...	2.0
Antimony oxide (Sb_2O_3) ...	1.0
Potassium nitrate	3.0
Sodium carbonate (Na_2CO_3) ...	14.0
Boric anhydride (B_2O_3) ...	24.0

A colourless and fusible glass withstanding rapid changes of temperature exceptionally well.

	Parts.
(7) Sand	65.0
Alumina (Al_2O_3)	1.0
Calcium carbonate	0.6
Arsenious oxide (As_2O_3) ...	2.0
Antimony oxide (Sb_2O_3) ...	1.0
Potassium nitrate	3.0
Anhydrous borax ($\text{Na}_2\text{B}_4\text{O}_7$) ...	26.68
Boric anhydride (B_2O_3) ...	5.5

The same glass as (6) but the ingredients have been varied to avoid the use of so much boric anhydride, which is at present apparently difficult to obtain on a commercial scale.

Resistance-Glass :—

	Parts.	
(8) Sand	65.5	A glass almost identical in its general behaviour with Jena resistance glass; withstands changes of temperature well but, like Jena, is not suitable for working before the blowpipe. It darkens and tends to devitrify; operations—such, for instance, as sealing side tubes into flasks—are difficult, if permanent and neat joints are required.
Alumina (Al_2O_3)	2.5	
Magnesia (MgO)	5.0	
Zinc oxide (ZnO)	8.0	
Sodium carbonate (Na_2CO_3) ...	10.2	
Borax anhydrous ($\text{Na}_2\text{B}_4\text{O}_7$) ...	13.0	

Formula No. 3, recommended for pharmaceutical purposes, ampoules, etc., may be substituted for the resistance glass with advantage, as the ampoule glass lends itself very well to blowpipe work, and is also especially resistant chemically.

Alternative for Combustion Tubing :—

	Parts.	
(9) Sand	72.0	This glass is capable of withstanding high temperatures and rapid changes of temperature; works well before the blowpipe and is free from the chief defect of Jena glass, namely, the readiness with which it becomes cloudy and finally quite opaque after prolonged use.
Alumina (Al_2O_3)	10.0	
Calcium carbonate	11.0	
Magnesia (MgO)	0.5	
Potassium nitrate (KNO_3) ...	3.0	
Sodium carbonate (Na_2CO_3) ...	11.2	
Borax anhydrous ($\text{Na}_2\text{B}_4\text{O}_7$) ...	7.2	

By slight modifications of this formula, almost any degree of hardness can be obtained.

In formulas (8) and (9) substances such as magnesia (MgO) and zinc oxide (ZnO) can be added in the form of carbonates if the actual percentages of MgO and ZnO respectively present in the carbonates are known.

Soft Soda-Glasses suitable for Tubing and for X-Ray Bulbs :—

	Parts.	
(10) Sand	68.0	These glasses do not lose their easy-working qualities after repeated heating and blowing, and are plastic over a long range of temperature. They require a temperature of at least 1,400 to 1,500° C. for complete incorporation of the ingredients in order to obtain that homogeneity
Alumina (Al_2O_3)	4.0	
Calcium carbonate (CaCO_3) ...	12.8	
Potassium nitrate (KNO_3) ...	14.5	
Sodium carbonate (Na_2CO_3) ...	26.0	

	Parts.	
(II) Sand	68.0	which is necessary for resistance to rapid changes of temperature and ease of working before the blowpipe. No. (10), containing potassium nitrate, is considered the better of the two, and is more easily incorporated.
Alumina (Al_2O_3)	4.0	
Calcium carbonate	12.8	
Potassium carbonate (K_2CO_3)	10.0	
Sodium carbonate (Na_2CO_3) ...	26.0	

The Committee consider that the formulas they have obtained and the work they have done on the various glasses justify them in the opinion that there is now information available for the manufacture of all the important glasses used in the laboratory and for industrial purposes, which have hitherto been mainly obtained from abroad.

Reagents.—Simultaneously with this Part of the Proceedings, a pamphlet is being issued containing a list of reagents for analytical purposes with notes indicating the standards of purity regarded as necessary for analytical work. This publication has been prepared by a Special Committee of the Councils of the Institute and the Society of Public Analysts, appointed in September, 1914, to consider what steps should be taken to ensure a satisfactory supply of laboratory reagents.

The Committee learn that several firms are prepared to manufacture practically all the reagents ordinarily required, and, in addition, many other substances in demand by chemists in various branches of work.

The Committee have suggested to manufacturers that the labels on bottles containing materials complying with the tests prescribed in the pamphlet should bear the letters "A. R." signifying analytical reagent. Moreover, the Committee urge that all users should demand reagents of British manufacture specifying the firms whose products they require.

Examinations.—In addition to the Examinations to be held in London in June—July, the Council will endeavour to arrange for local examinations at any centre where at least ten Candidates are desirous of presenting themselves for the Intermediate Examination or for Branch (a), Mineral Chemistry, or Branch (d), Organic Chemistry, in the Final Examination.

Obituary.

EUSTACE CAREY died at Liverpool on March 3rd, in his eightieth year. He was educated at University College School, London, and the Royal School of Mines. In 1857 he became connected with Messrs. Gaskell, Deacon & Co., Chemical Manufacturers, Widnes, and in 1871 was made a partner. In 1890 the firm was merged into the United Alkali Co., Ltd., and Mr. Carey was appointed Secretary, from which position he retired last year. His name is associated with important improvements in the Leblanc soda process, especially in connection with the production of chlorine and bleaching powder. He was a founder and Past President of the Society of Chemical Industry. He was elected a Fellow of the Institute in 1878, resigned in 1882, and was re-elected in 1908.

RUSSELL FORBES CARPENTER died at West Hampstead, London, on February 1st, in his sixty-ninth year. He was the son of Professor W. B. Carpenter, F.R.S., the physiologist, naturalist and author of several books on the microscope. Mr. Carpenter was educated at University College School and University College, London. On leaving college he was appointed assistant to Professor Graham, Master of the Mint, and later went to Bristol, where he obtained his first industrial experience on the staff of the Netham Chemical Company. He was compelled to relinquish his work on account of ill-health, and took a prolonged rest. Early in 1882 he was appointed a sub-inspector under the Alkali Act of that year, and took up his duties in the Midland district. He was promoted, in 1884, to full Inspector for North and East Lancashire, and parts of Yorkshire and Cheshire, in which appointment he continued until 1895, when he was made Chief Inspector under the 1892 Act, a position which he held until his retirement in 1910. Mr. Carpenter always took a keen interest in the manufacture of coal tar by-products, and saw during his administration as Chief Inspector the early development of the modern coke-oven industry in this country, as well as the many gradual improvements in chemical works under the regulations of the Alkali Acts, which he helped to frame. He was a founder and past Chairman of the Manchester Chemical Club, an Original Member and past Vice-President of the Society of Chemical Industry. He was an Original Fellow of the Institute, and served as a Member of Council (1907-09) and as a Censor (1908-09).

ROBERT FLEMING MACFARLANE died at Cardiff on January 26th, in his fifty-sixth year. He received his early chemical training in the laboratory under Messrs. Wallace, Tatlock and Clark, at Glasgow, and under Prof. Blyth at Anderson's College, Glasgow. In 1876 he became chemist to the Tharsis Sulphur and Copper Co., Ltd., of Glasgow; and in 1884 he was appointed Assistant Manager and Chemist to the Palhal Mining Co., of Estamaja, Portugal, but held that position for only a short time, and was engaged by Messrs. Matheson to investigate the electrolytic separation of copper from sulphide ores. In 1885 he became Chemist and Assistant Manager at the South Wales works of the Rio Tinto Co., Ltd.; in the fol-

lowing year Head Chemist at the Company's London offices ; and in 1887, Manager at their works at Jarrow-on-Tyne and at Port Talbot, South Wales, positions he held for eight years. In 1895 he was appointed manager to the Tharsis Copper Works at Cardiff, a position he held until his death. He was elected a Fellow of the Institute in 1888.

FREDERICK ERNEST POLLARD died at Hertford on February 28th, aged fifty-five years. He obtained his early chemical training under Prof. Attfield at the School of the Pharmaceutical Society, and in 1880 became Assistant Chemist to the Zoedone Co., first at Wrexham and later at Bombay and Calcutta. In 1883 he returned to England and conducted a consulting practice at Hertford, where he remained until 1888, when he was appointed Analyst to the Public Health Department, Cairo. In 1890 he resumed practice at Hertford. He was elected a Fellow of the Institute in 1888.

EDWARD COX SEATON died in London on February 13th, aged sixty-seven years. He was appointed Medical Officer of Health to Nottingham in 1872, and to Chelsea in 1884. He subsequently became the first health Officer to the county of Surrey, a position which he held until 1910. He was also lecturer at St. Thomas' Hospital Medical School for many years. Dr. Seaton was a special Government Commissioner on the Housing of the Working Classes Inquiry in 1890, and was one of the pioneers of the movement which resulted in the compulsory notification of infectious diseases. He was elected a Fellow of the Institute in 1887.

ALFRED WOLF died at Church, near Accrington, on January 1st. He was educated at the Universities of Leipzig and Wurzburg during the years 1867 to 1871. He obtained the degree of Doctor of Philosophy at Leipzig in 1871, and in the same year was appointed Assistant Agricultural Chemist at the Pommeritz laboratories in Saxony. In 1872 he became Assistant at the Royal High Technical School at Chemnitz, and from 1873 to 1875 was engaged at the Ostermann Alkali Works at Barmen. In 1876 he was appointed Managing Chemist at Messrs. Read, Holliday & Son's Alizarine Works at Elberfeld, and then came to England as managing chemist at the firm's works at Deptford. In 1878 he became Chemist in the Azo-colour Department at the Huddersfield Aniline Works, where he remained until May, 1883, when he was appointed Managing Chemist at the Cleveland Chemical Works, Middlesbrough. In 1892 he went to the Holland Bank Chemical Works, at Accrington, where he remained until his death. He was elected a Fellow of the Institute in 1887.

The Library.

Since the issue of the Proceedings for 1914, Part II., the Committee have had much pleasure in acknowledging the following Gifts:

GIFTS OF BOOKS.

- ATAK, F. W., M.Sc., A.I.C. :**
Intermediate Practical Chemistry for University Students. F. W. Atak. *London*, 1914.
- BROWN, Mrs. J. CAMPBELL :**
Practical Chemistry: Qualitative Exercises and Analytical Tables for Students. The late J. Campbell Brown. *London*, 1913.
Essays and Addresses. The late J. CAMPBELL BROWN. *London*, 1914.
- CARPENTER, CHARLES, D.Sc., M.INST.C.E. :**
The Purification of Gas by Heat: A Century's Progress and its Lessons. Chas. Carpenter. *London*, 1914.
- The Proprietors of the Journal of Biological Chemistry (per H. D. DAKIN, D.Sc., F.I.C., and A. N. RICHARDS):
Journal of Biological Chemistry, Vols. XV—XIX. *Philadelphia*, 1914—1915.
- HAMMOND, W. A. :**
Science and Religion. Seven Men of Science. *London*, 1914.
- HANCOCK, WALTER C., B.A., F.I.C. :**
A number of Volumes of the Journal of the Royal Society of Arts.
- HOUSTON, A. C., D.Sc., M.B. :**
Studies in Water Supply. A. C. Houston. *London*, 1913.
- JAQUES, ARTHUR, M.Sc., D.Sc., F.I.C. :**
Complex Ions in Aqueous Solutions. Arthur Jaques. *London*, 1914.
- KEANE, CHARLES A., Ph.D., D.Sc., F.I.C. :**
Technical Methods of Chemical Analysis. Vol. III., Parts 1 and 2. G. Lunge and C. A. Keane. *London*, 1914.
- KINGSCOTT, P. C. R., B.Sc., A.I.C., and KNIGHT, R. S. G., B.Sc., A.I.C. :**
Methods of Quantitative Organic Analysis. P. C. R. Kingscott and R. S. G. Knight. *London*, 1914.
- KNIBBS, G. H., Australian Commonwealth Statistician :**
Official Year Book of the Commonwealth of Australia: Statistics for period 1901—1913. *Melbourne*, 1914.
- MASSACHUSETTS, STATE BOARD OF HEALTH OF :**
Forty-Fifth Annual Report. *Boston*, 1914.
- THE GENERAL MEDICAL COUNCIL :**
The British Pharmacopœia. *London*, 1914.
- PURVIS, J. E., M.A., F.I.C. :**
The Chemical Examination of Water, Sewage and Foods. J. E. Purvis and T. R. Hodgson. *Cambridge*, 1914.

BOOK PURCHASED.

Deutsche Chemische Gesellschaft. *Literatur Register der Organischen Chemie.* Edited by R. Stelzner. *Braunschweig*, 1913.

JOURNALS.

The following is a list of Journals supplied to the Library of the Institute:—

Anales de la Sociedad Española de Física y Química.	The Journal and Proceedings of the Chemical Society.
The Analyst.	The Journal of the Institute of Brewing.
*Berichte der Deutschen Chemischen Gesellschaft.	The Journal of the Royal Society of Arts.
The British and Colonial Druggist.	The Journal of the Society of Chemical Industry.
The British Food Journal.	The Journal of the Society of Dyers and Colourists.
The British Journal of Photography.	The London University Gazette.
Bulletin de la Société Chimique de France.	Metallurgical and Chemical Engineering.
The Chemical News.	Nature.
The Chemical Trade Journal.	The Oil, Paint, and Drug Reporter.
The Chemical World.	The Pharmaceutical Journal.
*Chemiker-Zeitung.	The Plumbing Trade Journal.
*Chemisches Zentralblatt.	The International Sugar Journal.
The Chemist and Druggist.	The Transactions of the Institution of Mining Engineers.
Civil Engineering.	*Zeitschrift für angewandte Chemie.
The Electrician.	
The Journal of the Board of Agriculture.	

JOURNALS, &c., WANTED.

The Library Committee will be greatly obliged by gifts of any of the following, which are needed to complete sets:—

<i>Publication.</i>	<i>Wanted.</i>
The Analyst	Vols. 3 and 4.
The Chemical News	Vol. 28; many numbers of 29 and 30.
The Chemical Trade Journal ...	Vol. I; many parts of Vols. 9-19; and No. 610.
Chemiker-Zeitung	Vols. 1-17, inclusive.
Chemisches Zentralblatt ...	The first four series, and Vols. 1-5, inclusive, of the 5th series.
Comptes Rendus	Prior to 1878, and since 1893.
Journal of the Board of Agriculture	Prior to April, 1905 (except Vol. 1, and parts 1 and 2 of Vol. 2).

* Temporarily discontinued.

<i>Publication.</i>	<i>Wanted.</i>
Journal of the Institute of Brewing	1898 (Nos. for January and March) ; 1899 (Nos. for February and December).
Journal of the Royal Society of Arts	Many early volumes and parts before 1886.
Metallurgical and Chemical Engineering	Vols. 1-4 of The Metallographist, inclusive.
Nature	Vols. 35-37, inclusive ; many parts of 38 and 39, all 40, many parts of 41, 42-44, inclusive ; and 62-64, inclusive.
Proceedings of the Royal Society	Prior to Vol. 12 (1862), and since Vol. 24 (1876).
Zeitschrift für angewandte Chemie	All prior to 1898 ; and 1901.

The Library Committee look to the Fellows and Associates for the continuance of their generous support.

FELLOWS, ASSOCIATES, STUDENTS AND CANDIDATES FOR EXAMINATION SERVING WITH THE COLOURS.

(SUPPLEMENTARY LIST.)

*It is requested that any inaccuracy or omission be reported
immediately to the Registrar.*

FELLOWS.

Barrowcliff, M., Malay States Volunteer Rifles.
Bassett, F. L., 2nd Lieut. Royal West Kent Regiment.
Browne, Frank, Hongkong Volunteer Reserve.
Cowap, J. C., Penang Volunteer Rifles.
Eaton, B. J., Serjeant, Malay States Volunteer Rifles.
Franklin, A. C., Sergeant Hongkong Volunteer Reserve.
Hampshire, C. H., Hon. Artillery Company.
Harrington, A. G., Singapore Volunteer Rifles.
Law, Robert, Major, C.O. 4th Australian Engineers.
Murphy, Paul, Inns of Court O.T.C.
Neville, H. A. D., Captain Essex (Fortress) R.E.
Smith, T. A., Lieut. 2/5th Battalion Lincolnshire Regiment.

ASSOCIATES.

Bunker, S. W., 2nd Lieut. 1st Battalion Royal Fusiliers.
Chown, C. R., Cadet London University O.T.C.
Davidson, A. L., Gordon Highlanders.
Gemmell, Alex., 2nd Lieut. Edinburgh University O.T.C. (T.F., unattached).
Phillips, H. A., Friends' Ambulance Unit (Red Cross).
Walker, F. G. C., Lieut. 14th Battalion West Yorkshire Regiment.

STUDENTS.

Butler, F. H. C., 4th (1st Reserve) Battalion Hampshire Regiment.
Dovey, E. R., Hongkong Volunteers.
Holt, H. D. G., 2nd Lieut. 15th (Service) Battalion Royal Fusiliers.
Muggeridge, H. D., 2nd Lieut. 8th (Service) Battalion Royal Sussex Regiment.
Nelson, W. R. F., University of London O.T.C.
Pullman, D., 2/7th Devon Cyclists.
Taylor, H. A., Hongkong Volunteers.
Thompson, S. G., 2/1st West Kent Yeomanry.

CANDIDATE FOR EXAMINATION.

Vinicombe, L. F., 2nd Lieut. 10th Battalion Devon Regiment.

Since the publication of the list given in Proceedings, Part I, entries have been altered in the following cases :—

FELLOWS.

Bruce, Robert, 2nd Lieut. 16th Battalion Highland Light Infantry.

Foster, J. A., Captain 11th Battalion East Yorkshire Regiment.

Hodgson, T. R., Captain East Lancashire Divisional Transport and Supply Column, A.S.C. (T.F.).

ASSOCIATE.

Painbridge, J. S., Sergeant-Major 1st Line 4th Battalion, Yorkshire Regiment.

STUDENTS.

Greaves, Reginald, Corporal 19th (Service) Battalion King's Liverpool Regiment.

Shipston, G. T., Lieut. 2/5th Battalion Leicestershire Regiment.

The Register.

Since the publication of Proceedings, Part I., 1915, the Council have elected 1 new Fellow, 2 Associates have been elected to the Fellowship, and 7 Students have been admitted. 6 Fellows have died.

New Fellow.

Senter, George, D.Sc. (Lond.), Ph.D. (Leipzig), The Birkbeck College, Breems Buildings, Chancery Lane, London, W.C.

Associates Elected to the Fellowship.

Morris, Robert Leitch, 6, Buckingham Road, Brighton.

Prescott, William George, B.Sc. (Lond.), c/o The River Plate Fresh Meat Co., Ltd., Campaña, Argentine Republic, South America.

New Students.

Beecroft, Sydney Bowers, 12, Mariner's Terrace, Dewsbury Road, Leeds.

Dakers, Robert Gillies Muir, Brae Villa, Haddington, Scotland.

Gibson, James, junr., Blackland Cottage, Paisley.

Jay, Arthur Howard, 86, St. Alban's Avenue, Bedford Park, London, W.

Marks, Henry Percy, 3, Cranley Mansions, Muswell Hill, London, N.

Mills, Laurence Harry, Rowley Regis, Birmingham.

Rankin, John, Ravenslea, Bothwell.

DEATHS.

Fellows.

Carey, Eustace.

Carpenter, Russell Forbes.

Macfarlane, Robert Fleming.

Pollard, Frederick Ernest.

Seaton, Edward Cox, M.D. (Lond.), M.R.C.S. (Eng.).

Wolf, Alfred, M.A., Ph.D. (Leipzig).

Erratum.—The statement in the report of Council recording the death of Mr. R. C. Menzies was incorrect. His name has been restored to the Register.

General Notices.

Intermediate and Final Examinations: June—July, 1915.—The next Intermediate and Final Examinations will be held in June—July.

The Final Examination in Branch (*c*), the Chemistry and Microscopy of Food and Drugs, etc., is open to Fellows and Associates who desire to obtain the Certificate of the Institute in Therapeutics, Pharmacology, and Microscopy. This Certificate is accepted by the Local Government Boards under the Regulations as to the competency of Public Analysts.

For further particulars, and forms of application, communications should be addressed to the Registrar.

The entry list for the June—July examinations will be closed on Tuesday, May 25th.

Notice to Associates elected prior to April, 1912.—Associates elected prior to April, 1912, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry for at least three years since their election to the Associateship, can obtain forms of application for election to the Fellowship.

Final Examination in Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action: October, 1915.—An examination in Biological Chemistry, etc., will be held at the Laboratories of the Institute in October, 1915. This examination is open to any Fellow or Associate, to any Candidate whose application for admission to the Final Examination has been accepted by the Council, and to any Candidate who has passed the Intermediate Examina-

tion of the Institute. The examination extends over at least four days, and may be theoretical and practical, written and oral. The syllabus includes Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action, with special reference to the Chemistry and Bacteriology of Food-Stuffs, Water Supply, and Sewage Disposal, and the application of Biological Chemistry to Industries and Manufactures.

The entry list will be closed on Tuesday, September 14th.

For further particulars application should be made to the Registrar.

Examinations in Chemical Technology, October, 1915.—The Chemical Technology Examinations Board will be prepared to hold an examination in October next. The exact date will be announced later.

The examination will be open only to Fellows and to those Associates who have been registered as such for at least one year, and who produce satisfactory evidence of technological training or experience.

Candidates who desire to present themselves are required to forward their applications and fees not later than Tuesday, September 14th, and to mention one important branch of industry, in connection with which their knowledge of the subjects of the examination may be tested.

For further particulars, application should be made to the Registrar.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the office of the Institute. For full information, enquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in making known suitable appointments for professional chemists.

PRESENT POSITION OF THE BUILDINGS FUND.

	£	s.	d.	£	s.	d.
Estimated Total required (including additional work put in hand since the Committee were informed of the legacy to the Institute under the Will of the late Edward Riley and the Donation of £500 from an anonymous friend for paneling the Council Room, etc.)						
				19,880	0	0
Total received or promised to date, including the £500 referred to above (<i>Actually</i> received: £16,097 16s. 0d.) ...	16,748	5	7			
Interest and Dividends ...	1,141	10	9			
	17,889	16	4			
Legacy under the Will of the late Edward Riley ...	1,000	0	0			
	18,889	16	4			
<i>Less</i> Incidental Expenses to date ...	264	16	2			
				18,625	0	2
Approximate Amount yet required ...				£1,254	19	10

30, RUSSELL SQUARE,
LONDON, W.C.

12th April, 1915.

THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED, 1877.

INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,
1915.

PART III.

PROCEEDINGS OF THE COUNCIL (MARCH—JUNE, 1915).
OBITUARY.

ABSTRACT OF THE REPORT OF THE BOARD OF EXAMINERS:
INTERMEDIATE AND FINAL EXAMINATIONS, APRIL, 1915.

THE LIBRARY.

CHANGES IN THE REGISTER.

NOTICES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,
August, 1915.

Proceedings Committee, 1915-16.

E. W. VOELCKER (*Chairman*),
SIR JAMES J. DOBBIE (*President*),
LEONARD ARCHBUTT,
H. BALLANTYNE,
EDWARD J. BEVAN,
GEORGE EMBREY,
M. O. FORSTER,
H. R. LE SUEUR,
W. H. ROBERTS,
F. W. STODDART,
W. L. SUTTON.

Proceedings of the Council.

MARCH—JULY, 1915.

British Chemical Industries.—In March last the President and Council of the Royal Society submitted a memorial to the Prime Minister directing attention to the position of certain chemical industries in this country as revealed by the effects of the war.

In the memorial it was shown that these industries were of the greatest national importance, both in connection with the production of war material and also in view of the dependence of the welfare of immense numbers of workers on the continuance of various branches of chemical industry.

The comparatively backward state of certain branches was attributed to: (1) failure to realise that modern industry to be successful must be based on scientific research, and (2) the want of more intimate association between the manufacturers and the workers in science.

It should be recognised as essential to the maintenance and future progress of such industries that some permanent central national organisation should be created, and it was urgently necessary that the Government should give practical effect to this proposal. The Advisory Committee appointed by the Board of Trade might form the nucleus of such a permanent organisation, which should be of the nature of an Intelligence Department, serving the chemical industries in the same way as the Commercial Intelligence Department of the Board of Trade serves merchants and traders.

The chemists of the country considered it imperative on national grounds that all proposed new developments should be pushed forward with as little delay as possible, and offered to place their services and their laboratories at the disposal of the Government for the purpose of advising on and conducting investigations which might be required for the solution of special problems.

The position was summarised as follows :—

Many branches of industry dependent on foreign chemical manufactures were seriously affected by the war. The development of such industry in this country required expert co-operation, and a considerable increase in the number of research workers was necessary in order to hasten progress and to insure the permanent retention of new manufactures.

The Advisory Committee referred to was already available, and it could

be suitably strengthened as an organisation for the service of the nation in the present emergency; while it was believed that if the Government would give official support for such a Chemical Committee, under the auspices, say, of the Board of Trade, the confidence of manufacturers would be secured to an extent that had hitherto been unrealisable.

With increased facilities of communication between manufacturers and expert advisers, such advice as the latter would be able to give would be more and more sought by the manufacturers concerned, and the industries correspondingly benefited.

It was arranged that the President of the Board of Trade should receive a joint deputation from the Royal Society and the Chemical Society, with representatives from the Councils of the Institute of Chemistry, the Society of Chemical Industry, and the Society of Public Analysts.

The Council of the Institute appointed Prof. Raphael Meldola as their representative, but, as he was prevented by illness from acting in that capacity, Mr. E. W. Voelcker, Vice-President, and Prof. Herbert Jackson were appointed instead.

The following report of the deputation was issued to the Press, in due course, by the Board of Trade:—

The deputation was received by the President of the Board of Trade and the President of the Board of Education at the Board of Trade Offices, 7, Whitehall Gardens, on May 6th. With Mr. Runciman and Mr. Pease were Dr. Addison, M.P., Sir H. Llewellyn Smith, Sir L. A. Selby-Bigge, Mr. Ogilvie, Dr. Heath, and Mr. Percy Ashley.

The deputation consisted of Sir William Crookes, Prof. A. W. Crossley, Dr. H. J. H. Fenton, Dr. M. O. Forster, Prof. W. H. Perkin, Prof. W. J. Pope, Prof. Arthur Schuster, Prof. A. Smithells, Prof. J. F. Thorpe, and Mr. R. W. F. Harrison, representing the Royal Society; Dr. Alexander Scott, Prof. F. G. Donnan, Prof. Percy F. Frankland, Prof. J. C. Philip, Sir William A. Tilden, and Dr. Samuel Smiles, representing the Chemical Society; Mr. A. Chaston Chapman (President of the Society of Public Analysts), Dr. G. G. Henderson (President of the Society of Chemical Industry), Mr. E. W. Voelcker and Prof. Jackson representing the Institute of Chemistry.

Prof. W. H. Perkin, Sir William Tilden, Prof. Percy Frankland, Prof. W. J. Pope, and Dr. Martin O. Forster spoke in support of memorials from the Royal Society and the Chemical Society which had been submitted to His Majesty's Government on the position of the chemical industries, and the steps which might be taken to improve their status and efficiency in the United Kingdom. The speakers drew attention to the fact that the comparatively backward state of certain industries in this country was due to a failure to realise that modern industry to be successful must be based on scientific research, and to the lack of association between manufacturers and science,

combined with a want of scientific knowledge and appreciation of the importance of scientific work amongst the public generally, and the lack of organisation among the various chemical and allied industries.

The deputation advocated Government assistance for scientific research for industrial purposes, the establishment of closer relations between the manufacturers and scientific workers and teachers, and the establishment of a National Chemical Advisory Committee for these purposes.

Mr. Runciman, in reply to the deputation, pointed out that the Board of Trade fully appreciated the extent to which national industrial progress is dependent upon the utilisation of the services of men of science, and the importance of provision for the thorough training of a very much larger number of industrial chemists than are at present available. He agreed with the views expressed as to the need of closer co-operation between manufacturers and scientific workers and teachers. The war had shown the weakness of our position in certain important respects, and he was in full sympathy with the general views expressed by the deputation. The actual proposals would receive careful and sympathetic consideration.

Mr. Pease informed the deputation that the particular problems to which they had drawn attention had been present to the Board of Education for some time past, and that a scheme had been approved in principle by which substantial additional assistance would be given by the Government to scientific education and to industrial research. He hoped that, though the funds immediately available might not be large, they would be sufficient to enable an organisation to be brought into being at an early date, which would be capable of expansion subsequently. Mr. Pease further expressed his appreciation of the offer of assistance and advice by members of the two societies represented at the deputation.

Sir William Crookes expressed the thanks of the deputation for the sympathetic reception with which they had met.

Later, Mr. Pease, as President of the Board of Education, announced in the House of Commons, on May 13th, that the Government would appoint an Advisory Council on Industrial Research, and that he hoped to place on the estimates for the current year a sum between £25,000 and £30,000 for research purposes, indicating at the same time that an annual grant of a larger sum would be desirable in the future.

On the reconstruction of the Cabinet, Mr. Henderson succeeded Mr. Pease, and shortly afterwards, the Board of Education published the particulars of a "Scheme for the Organization and Development of Scientific and Industrial Research," providing for the establishment of:—

- (a) A Committee of the Privy Council responsible for the expenditure of any new moneys provided by Parliament for scientific and industrial research ;
- (b) A small Advisory Council responsible to the Committee

of Council and composed mainly of eminent scientific men and men actually engaged in industries dependent upon scientific research.

The Committee of Council will consist of the Lord President, the Chancellor of the Exchequer, the Secretary for Scotland, the President of the Board of Trade, the President of the Board of Education (who will be Vice-President of the Committee), the Chief Secretary for Ireland, together with such other ministers and individual members of the Council as it may be thought desirable to add.

The first non-official members of the Committee will be:—

Lord Haldane, Mr. Arthur H. D. Acland, and Mr. Joseph A. Pease.

The President of the Board of Education will answer in the House of Commons for a sub-head on the vote, which will be accounted for by the Treasury under Class IV., Vote 7, "Scientific Investigations, etc."

The first members of the Council will be:—

Sir William S. McCormick, Administrative Chairman,
Lord Rayleigh, Dr. G. T. Beilby, Mr. W. Duddell, Prof.
E. Hopkinson, Prof. J. A. M'Lelland, Prof. R. Meldola,
and Mr. R. Threlfall.

British Dyes, Ltd.—In view of the remarks made by Prof. Meldola in his address at the Annual General Meeting of the Institute on March 1st last, the Fellows and Associates will be interested to note that at a meeting of the shareholders of British Dyes, Ltd., held at Manchester on July 13th, Mr. James Falconer, M.P., reported on the progress of the company's efforts in the direction of establishing national works for the manufacture of synthetic dyes. After dealing with financial matters, he stated that they proposed to establish a Research Department, for which they had received a grant from the Government, and they had invited Prof. Gilbert T. Morgan, of the Royal College of Science for Ireland, to be head of that Department. They were also appointing

a Technical Committee to give advice on technical questions, including Dr. M. O. Forster, Dr. J. C. Cain, Prof. Gilbert T. Morgan, and Mr. Joseph Turner. Further, they had resolved to appoint an Advisory Council, under the Chairmanship of Prof. Raphael Meldola, and including the following: Prof. J. Norman Collie, Prof. Arthur W. Crossley, Prof. Percy F. Frankland, Prof. A. G. Green, Prof. G. G. Henderson, Prof. J. T. Hewitt, Prof. F. Stanley Kipping, Prof. Arthur Lapworth, Prof. Arthur G. Perkin, Prof. W. H. Perkin, Prof. W. J. Pope, Prof. J. F. Thorpe, and Prof. W. Palmer Wynne.

Board of Inventions and Research.—The Admiralty have announced the organisation of an Inventions Board to assist in co-ordinating and encouraging scientific effort in connection with the requirements of the Naval Service. The Board will comprise: (a) A Central Committee; (b) a Panel of Consultants composed of scientific experts who will advise the main Committee on questions referred to them. The Central Committee will consist of: Lord Fisher of Kilverstone, President, Sir J. J. Thomson, Sir C. A. Parsons, and Dr. G. T. Beilby. The Consulting Panel, which may be added to from time to time if necessary, will comprise: Prof. H. B. Baker, Prof. W. G. Bragg, Prof. H. C. H. Carpenter, Sir William Crookes, Dr. W. Duddell, Prof. Percy F. Frankland, Prof. Bertram Hopkinson, Sir Oliver Lodge, Prof. W. J. Pope, Sir Ernest Rutherford, Mr. G. Gerald Stoney, and Prof. the Hon. R. J. Strutt.

Professional Chemists and the War.—Apart from the large contribution of Members and Students to the fighting and auxiliary forces, the Council of the Institute took early steps to be prepared for providing the Government with the help of professional chemists in various matters connected with the war.

As a result of the abnormal demand for chemists during the past few months, due to a large extent to the absence of so many on active service, the number of Fellows and Associates available for appointments was considerably reduced and,

therefore, in view of the fact that the Registrar had been authorised by the Ministry of Munitions to receive applications from chemists desiring to be employed on Government industrial work, a far larger list was prepared, including many Graduates and Students not on the Register of the Institute. From this list the departments concerned have secured professional chemical assistance without difficulty, though it was not possible in some cases to supply as many chemists as were required who had actual experience of certain branches of manufacture. A good response was received, however, from men who had had practical industrial experience, their employers having agreed to release them to assist the Government for the period of the war; while others who had previously been engaged in teaching and analytical work were afforded an opportunity of securing probationary experience in works' operations before proceeding to more responsible appointments.

A further list has been maintained, at the Institute, of chemists and students who desired to volunteer for Government work in any capacity in which their scientific training might be useful. The conditions varied with the nature of the duties involved and the standard of scientific attainment required. In certain cases the authorities intimated that two years' systematic training would be regarded as satisfactory evidence of competence and, although some chemists with recognised qualifications and experience offered their services for work requiring comparatively slight scientific knowledge, a large number of competent men were yet available for the various departments open to them.

So far as service with the army was concerned, it was officially announced in the House of Commons that Fellows of the Institute were eligible for commissions, and in the lists which have been published it will be observed that many Fellows and Associates hold commissioned rank. Over 300 Fellows, Associates, Students and Candidates for Examination are serving with the colours. The names of most of

these have already been mentioned in the Proceedings. A supplementary list, giving the names of additional men who have joined and notifying alterations in rank, unit, etc., will be published in Part IV.

A number of Fellows of the Institute have been granted commissions in the R.A.M.C., and others are known to be engaged in analytical work with the army.

In view of the pressing need for medical men at the front, the Institute approached the Government, pointing out that officers of the Royal Army Medical Corps engaged in analytical work might be replaced by professional chemists and bacteriologists having special experience in the examination of water, etc. To this the Council received an assurance that the suggestion would not be lost sight of, and that a communication would be made to the Institute in the event of further professional chemical work being required with the medical service in the field.

The Council of the Institute also received the names of many Fellows and Associates offering their services and laboratories for research in connection with scientific matters having a bearing on the war ; but as the Councils of the Royal Society and the Chemical Society subsequently invited chemists to take part in the organisation of scientific work, communications were addressed to those Societies, briefly stating the steps already taken by the Institute, and intimating that any matter which they desired to refer to the Institute would receive careful attention.

The Chemical Society.—The Council of the Chemical Society having asked the Council of the Institute to appoint a Special Committee, to which could be referred questions relating to the manufacture of glass and also problems connected with the chemistry of hygiene and public health, the following have been constituted a Special Committee for these purposes :—Prof. J. Millar Thomson and Sir William Tilden, nominated by the Chemical Society ; Prof. Raphael Meldola, Prof. Herbert Jackson and Mr. Thomas R. Merton, members of

the Institute's Glass Research Committee ; and Mr. Cecil H. Cribb, Dr. Arthur Harden, and Prof. F. Gowland Hopkins.

The Council of the Institute have also requested Sir James Dobbie, as President, and Prof. Raphael Meldola, as immediate Past-President, to serve on the General Committee formed by the Chemical Society, the function of which will be to deliberate on all questions of general policy with reference to matters upon which it is desirable to have the opinion of a body representative of every department of chemical science.

Glass Research.—The work of the Glass Research Committee has proved of direct value to manufacturers, and the Committee believe that an adequate supply of laboratory ware and other types of glass previously imported from abroad is now practically assured. Shortly after the publication of the formulas, in Proceedings, Part II., the Committee had the great advantage of discussing technical details with representative manufacturers, who stated that the mixtures appeared to offer no serious difficulties, and this proved to be generally correct in actual practical experience.

Up to the present time, among the manufacturers who have made melts on the ton scale and who have reported on the work, Messrs. John Moncrieff, Ltd., of Perth, have produced glasses to formula No. 1, a soft soda glass for ordinary apparatus ; No. 6, a glass for miners' lamp glasses, which has passed quite satisfactorily the severe tests of the Home Office, the Department which had asked the Institute to provide this glass ; and No. 5, a glass for combustion tubing, which has proved entirely satisfactory and in some respects superior to Jena tubing.

Messrs. James Powell & Sons, of Whitefriars Glassworks, have produced glass to formula No. 10, on which they have expressed their satisfaction. The following letter to the Registrar, from the head of this firm, bears testimony to the value of the work of the Committee :—

" As representing one of the oldest manufactories in England, and as probably one of the oldest active glass-makers, I trust I may not be con-"

dered impertinent if I express my high appreciation of the work which the Glass Research Committee of the Institute of Chemistry have so successfully and patriotically carried out. No one, who has not experienced the innumerable pitfalls which surround the glass-maker, can fully realise the enormous amount of patient labour which the researches of the Committee represent. I venture to hope that the Committee may be able to extend their labours and deal on similar lines with optical glasses. As a rule, English glass-manufactories are small and without any adequate equipment for research. Glass manufacture in England would now be in a far stronger position than it is, if in the past an institution had been created, partly at the expense of the manufacturers and partly at the expense of the nation, to carry on researches like those which the Institute of Chemistry has recently carried out."

Mr. Frank Wood, whose firm—Messrs. Wood Bros. Glass Co., Ltd., Barnsley—is making glass to several of the formulas, has also expressed his views on the work of the Committee:—

"As a glass manufacturer I feel I must send you a line to say how much I appreciate the work done by the Glass Research Committee of your Institute during the past nine months.

"When I first had the pleasure of meeting your Committee I felt at once that the work you were doing was pioneer work of a most difficult and practical kind for the glass trade of Great Britain. There was nothing superficial or sensational about it and I for one wish to thank you most sincerely for your enterprising and laborious work, and simply say that I appreciate it at its real value.

"For some weeks I have been corresponding with Prof. Herbert Jackson on various details of the No. 10 X-ray formula in particular. . . . Nothing has been too much trouble and every difficulty about the X-ray glass has been finally cleared up by Prof. Jackson. It has been a real pleasure and privilege for me to have in some small way worked under the guidance of such an eminently practical scientist. . . . What a pity the glass manufacturers and your Committee did not think of meeting twenty years ago, before the fashion was established in this country that only German or Austrian Chemical Glass was of any use.

"Our works are now completing a machine for putting the brims on to beakers and flasks. We have already moulds for two sizes of conical flasks and in the course of a week or two hope to be able to turn out a really first-class highly-finished chemical flask. We are also prepared to make X-ray bulbs and tubing in any quantity."

Mr. Wood emphasises the disadvantage at which manufacturers are placed through the great variety of shapes and sizes of flasks and beakers, and suggests that, in view of the expense involved in making moulds, it would greatly encourage the manufacture of chemical laboratory ware in this country if the vessels were standardised. The Committee

* *

have this suggestion under consideration, and are communicating with the manufacturers and dealers on the subject.

Messrs. A. C. Cossor, Ltd., of Clerkenwell Road, London, have expressed their appreciation of the researches carried out at the instigation of the Institute in connection with the manufacture of soda glass and other glass. They say:—

“We are particularly grateful for the assistance which has been given us by Professor Jackson and Mr. Merton in placing us in possession of soda glass possessing a green fluorescence as required for the manufacture of X-ray tubes.

“This glass we have tested very fully, and find that it not only works excellently in the blow-pipe, but possesses the correct fluorescence which previously we have been unable to obtain in this country.”

With regard to formula No. 10—for X-ray tubes—referred to in the letters quoted above, the following statement was issued shortly after the publication of the preliminary report of the Committee:—

“The Glass Research Committee find that a glass such as that made from formula No. 10, recommended for X-ray bulbs, does not give a green phosphorescent glow if it is made from approximately pure materials. The slight glow given is blue. In view of the fact that a green phosphorescence appears to be preferred by users of X-ray tubes, it seemed desirable to determine the conditions for obtaining this effect. It has been traced to the presence of manganese, and such a glass as No. 10 will give this green glow if manganese dioxide is added to the batch mixture in the quantities frequently used to correct the colour due to iron.”

The Committee have lately received from Prof. Jackson and Mr. Merton a further formula, based on an analysis made by Mr. Gilbert J. Alderton, of a lead glass suitable as an enamel for sealing platinum into soft glass:—

	Parts.	
Red lead (Pb_3O_4)	55.3	This glass has a very low fusing point. It joins quite satisfactorily on to soft glass tubing and appears to possess all the essential properties of a reliable enamel for platinum wire.
Sand	38.0	
Potassium carbonate (K_2CO_3) ..	9.0	
Sodium carbonate (Na_2CO_3) ..	1.7	
Alumina (Al_2O_3)	1.0	
Calcium carbonate (CaCO_3) ..	1.0	

It has already been reported that the formulas are mainly based on the experiments made by Prof. Herbert Jackson and Mr. Thomas R. Merton, of King's College, of whose

services the Council of the Institute have recorded their grateful acknowledgment. Prof. Meldola, Chairman of the Committee, has conveyed the thanks of the Council to the Principal and Delegacy of King's College for allowing part of the work to be carried out at the College and expressing hearty appreciation of the value of this work.

The Committee have given preliminary consideration to the question of pursuing investigations in connection with optical glass, but as steps are being taken in this direction by the National Physical Laboratory, and the Government has been asked for a grant for the purpose, the matter is in abeyance. The Committee, however, have been invited to co-operate with the National Physical Laboratory, and a meeting will shortly be held to determine the scheme for the conduct of the research.

Analytical Reagents, Porcelain Ware and Filter Paper.—The work of the Joint Committee of the Institute and the Society of Public Analysts, appointed to consider what steps should be taken to ensure a continued satisfactory supply of laboratory reagents, has resulted in the ready co-operation of a number of manufacturers, who have undertaken to provide analytical reagents in accordance with the circular letter and the pamphlet of standards and tests published by the Committee.

The List of Analytical Reagents was issued, in April, with the covering circular to Fellows and Associates of the Institute, to Members of the Society of Public Analysts, to the public and technical Press, to the Universities and Colleges, and to many manufacturers throughout the Kingdom.

It is hoped that this action may contribute to the recovery of that portion of the trade in fine chemicals for analytical purposes which, through several causes, has been attracted away from this country.

The capability of our manufacturers to supply the great majority of such materials in a sufficient degree of purity being already established, the Councils believe that, as the necessity

of applying to foreign firms for a few highly purified materials is removed, the habit of unnecessarily purchasing abroad other products will be checked, to the advantage of British manufacturers and chemists.

The Councils hope that all users will help to further the object stated, not only now, but after the war, by abstaining from ordering foreign products until inquiry among British manufacturers has shown that they cannot meet requirements. Materials which conform to the standards indicated in the list will bear the letters "A. R.," signifying Analytical Reagent, and the Councils advise consumers in ordering from dealers to specify the particular maker whose products they desire, and to require that such products be forwarded in the original bottle or package, carrying the maker's label.

It is obvious that in some cases the higher degree of purity will involve increased cost to the purchaser, but it should be remembered that the ordinary commercial grade of such materials will still be available for general purposes.

The list does not comprise all the purified materials which can be supplied by British manufacturers; some firms have already intimated to the Committee their ability to supply a considerable number of other substances which are from time to time required by chemists.

The Councils cordially acknowledge the ready help which has been given by manufacturers who have undertaken to supply reagents, and most earnestly invite the loyal co-operation of all chemists, so that by the end of the war the practice of satisfying their chemical requirements from British sources may have become so firmly established as to survive the resumption of peace conditions.

Similarly, in the supply of porcelain ware and filter paper, the Councils acknowledge the response made by firms to whom reference was made in Proceedings, Part I., and urge all users of chemical ware to demand British-made products and thus show their appreciation of the action of firms which have undertaken to meet these requirements.

Society of Chemical Industry.—To promote the interests of British chemical industries a suggestion has been received from the Society of Chemical Industry that a register of manufacturers, importers and refiners of chemical products, and of makers of chemical plant, should be prepared and published, and that the Board of Trade and the Chemical Societies and Institutions in the country should be asked to support the scheme. The Council of the Institute have assured the Society of their approval of the scheme, and will give it their active assistance as far as possible. The Council suggested, however, that the publication should be restricted to actual manufacturers and producers, to the exclusion of mere agents.

Cotton.—The suggestion that the Government should declare cotton absolute contraband of war has created much interest and discussion among professional chemists. The matter was submitted to the Council of the Institute by Mr. Bertram Blount in January last, when the President—then Prof. Raphael Meldola—addressed a letter to the Department chiefly concerned; directing special attention to the importance of cotton in the manufacture of propulsive explosives, and offering the assistance of the Institute in the consideration of matters of this kind. To this a courteous acknowledgment was received, and an assurance that the Council of the Institute would be consulted if necessary. The Council received further letters on the subject in February, but, as the Prime Minister had then promised to make a statement with regard to it in the House of Commons, no action was taken. It was felt that the Government authorities must be fully informed on all the aspects of the matter, and could only have been guided by circumstances other than those which would warrant the Institute in making further representations.

Fisheries Notice, No. 5.—At the meeting of the Council held in March the attention of the Council was directed to Fisheries Notice, No. 5, issued by the Board of Agriculture and Fisheries, in December, 1914, giving instructions for taking samples for analysis in cases of suspected pollution of waters.

Paragraph II. of the Circular referred to the examination and analysis of water and fish for Boards of Conservators constituted under the Salmon and Freshwater Fisheries Acts, or for Local Fisheries Committees under the Sea Fisheries Acts, in which case no charge was made. Paragraph IX., however, provided that where samples or specimens were sent by persons other than those named in Paragraph II., a fee amounting to approximately £2 2s. would be charged for the examination and analysis.

It appeared to the Council of the Institute that the action of the Board in offering to make analyses of samples of water sent to them by the public—as distinct from the officers of certain public bodies—for a fee was a matter which affected the interests of practising professional chemists, and they requested, therefore, that representatives of the Institute might confer with the Board on the matter.

The Council of the Society of Public Analysts having asked to be associated with the Council of the Institute in any action that might be taken in this connection, a request was made to the Board that a joint deputation might be received. The Board replied that they were satisfied that their practice in respect of the examination of samples of water or specimens of fish from waters where pollution was suspected had not, in fact, been prejudicial to the interests of professional chemists, but that an officer of the Board would receive representatives of the Institute and the Society to discuss the question.

On April 15th Mr. Henry G. Maurice, Assistant Secretary of the Fisheries Division, received Mr. Edward Bevan, Mr. E. W. Voelcker (Vice-Presidents), and Mr. W. J. A. Butterfield, on behalf of the Institute, and Mr. A. Chaston Chapman (President) and Mr. P. A. Ellis Richards (Honorary Secretary), on behalf of the Society of Public Analysts. The Registrar of the Institute was also in attendance.

Mr. Voelcker, having introduced the deputation, stated that the circular had given rise to some apprehension among practising analysts, as it appeared to be an offer on behalf of the Board to undertake professional chemical

work for the public. Such action would affect the interests of the profession, and especially those of chemists who had made a special study of the pollution of fishing streams. If the Government undertook this work, it would deprive such men of part of their practice. Public bodies had their duly appointed officers, whose practices might be affected by the withdrawal of work to the Board, and, moreover, private persons were in the habit of entrusting such work to practising consultants. In view of the fact that the reports might lead to litigation, it did not seem to him desirable that official chemists appointed by the Board should appear against private practitioners in Court. He believed that at one time the Board of Inland Revenue had undertaken the analysis of water for private individuals, but, owing to difficulties which had arisen, the practice had been dropped.

Mr. Chaston Chapman endorsed the views of Mr. Voelcker, and stated that professional chemists viewed Paragraph IX. with some concern; the work was already efficiently done by practising chemists, and it was neither necessary nor desirable to attract the work to the Board or elsewhere. Professional competition on the part of a Government Department was unfair: it was subsidised, and, as the reports would bear the *imprimatur* of an official department, they would appear to carry more weight than those of a private practitioner. The action of the Board would constitute a dangerous precedent, which might be followed by other departments in connection with other branches of analytical and consulting practice. Further, the Board sent out circulars offering their services, a proceeding forbidden to private practitioners, whilst the mention of a fee was tantamount to prescribing a charge for work on which the private practitioner was entitled to decide for himself. Mr. Chapman referred to complaints made in 1905-06 with regard to the National Physical Laboratory. In that case, a Treasury Committee had defined the limits of the Laboratory's work, and had declared against the Laboratory being conducted so as to interfere with the work of practising professional chemists.

Mr. Bevan asked to what extent the circular had been distributed.

Mr. Butterfield stated that his attention had been drawn to the matter by a consulting engineer, who had seen a *précis* of the notice in *The Field*, and who gave his opinion that it cut at the root of professional practice. It was unfair that a Government Department should offer publicly to compete in professional practice.

Mr. Maurice, in reply, said that professional chemists had nothing to fear from the notice. Besides being sent to the authorities directly concerned, it had been sent only to the newspapers and journals interested in fishing, and to persons who had made application for them. The purpose of Paragraph IX. was to dissuade private persons from making frivolous inquiries, and was not intended to attract samples of water and fish. It was the practice of the Department to advise private persons to report matters to their Local Boards, so that, if they were of sufficient importance, the local authorities could communicate with the Board. In connection with salmon conservation, samples were occasionally sent to the Government Laboratory, but, in the event of legal action being necessary, it would be taken by the local authorities. Moreover, the officers of Government Departments did not give evidence, except in cases where the Crown undertook the prosecution. The action taken by the Board in connection with fisheries generally was to assist local authorities as far as they were able in the interests of the community.

Mr. Voelcker and Mr. Chapman expressed the opinion that, if Paragraph IX. was intended to discourage the public from sending samples, it

might have been eliminated altogether, or a statement might have been inserted to the effect that the Board did not undertake to examine such samples.

Mr. Maurice having promised that the views of the deputation should be laid before the Board for their consideration, the deputation thanked him for receiving them, and the interview closed.

The Council of the Institute was subsequently informed that the Board would consider the question of modifying or deleting Paragraph IX. of the notice when a reprint was required.

Gifts.—The Council have accorded their thanks to Mr. Thomas Tyrer for an engraving by Samuel Cousins, after a painting by Louis Dickinson, of Queen Victoria, the Sovereign from whom the Institute received the Royal Charter; and also to Mr. Arthur G. Bloxam for a series of portraits previously in the possession of his uncle, the late Sir Frederick Abel (President of the Institute, 1880—83). The portraits are of Bertholet, Berzelius, Chevreul, Dumas, Faraday, Gay-Lussac, Graham, A. W. von Hofmann, Huxley, Liebig, Pelletier, Pelouze, and Thénard.

The Appointments Register.—The Council have decided, in response to a request from the Government Commission for Providing Occupation for Belgian Refugees (controlled by the Local Government Board for England and Wales), to authorise the Registrar to send particulars of suitable vacancies, announced in the technical and daily Press, to Belgian refugee chemists and metallurgists. A number of such chemists have thereby been assisted to obtain professional employment while temporarily domiciled in this country.

Woolwich Arsenal.—The conditions attaching to the appointments of temporary assistants in the Chemical Laboratory of the Inspection Department of the Royal Arsenal, Woolwich, have been substantially improved, and the Depart-

ment has lately experienced no difficulty in obtaining the services of chemists for this important laboratory.

Regulations.—The necessity having arisen for reprinting the Regulations, the Council have adopted certain alterations recommended by the Nominations and Examinations Committee :—

- (i.) To the list of approved Preliminary Examinations the Council have added the new professional Preliminary Examination, to be conducted under the control of the Board of Education.
- (ii.) With regard to the training in Physics required by Candidates for the Associateship, the Council will accept the Intermediate Science standard of the recognised Universities, provided the Candidate supplements it by satisfactory training in Physical Chemistry (Degree standard) before admission to the Examinations of the Institute.
- (iii.) With regard to the list of qualifications entitling the holders to apply for admission to the Final Examination, the Council have decided that in the case of Candidates with specialised degrees, such as B.Sc. Tech., B.Sc. in Tinctorial Chemistry, M.Met., D.Met., etc., each case shall be considered on its merits.

The Council have considered an application from a Belgian refugee, inquiring whether he can be admitted to the Examinations and Membership of the Institute, but the Council were of opinion that they must adhere to their former practice of restricting the Membership to British subjects and chemists who have been trained or engaged in professional chemical work for some years in British Dominions.

The Special Regulations Committee have proceeded with the consideration of the suggestions advanced at the Conference of Professors of Chemistry held in October, 1913, and have received the advice of the Solicitors of the Institute on the proposed new Regulations for the admission of Associates and Fellows. They learn that the new scheme does not involve

any necessity to revise the Charter or Bye-Laws of the Institute, but some modifications have been adopted. The revised scheme will be submitted to an Extraordinary General Meeting of the Institute after the war.

Examinations.—The Council have received reports on the Intermediate and Final Examinations held in the new Laboratories of the Institute from April 12th to 16th, abstracts of which are given on pp. 25—33.

Thirty-six Candidates entered for the Examinations held in London, Dublin, and Glasgow between June 28th and July 16th, the reports on which will be dealt with in Proceedings, Part IV.

Notice of a Final Examination in Biological Chemistry, Fermentation and Enzyme Action, to be held in October, is given on p. 36. The Council will also be prepared to hold an Examination in Chemical Technology in October.

History of the Institute, 1877—1914.—A sufficient number of orders having been received for copies of the special edition of the History of the Institute, the work has now been put in hand. This edition, which is limited to 100 copies, will be printed on paper of superior quality provided by Messrs. Balston, of Maidstone, one of the firms which has successfully undertaken the manufacture of filter papers. The Proceedings Committee recognised that at the present time the demand would be somewhat limited, but as the type could not be kept standing for an indefinite period, the work could not be further delayed. A few copies will yet be obtainable at 10s. 6d. each. Any profit which may be available on the production will be credited to the Building Fund.

The New Premises.—The completion of the building has been unavoidably delayed owing to difficulties experienced in obtaining labour and materials; but the work of the main contract is practically accomplished, and little remains to be done except in the Council Room and Library, the panelling of which is well advanced.

The statue of Priestley has been placed in the niche over the main entrance. This piece of sculpture, the most conspicuous decorative feature of the building, has been executed by Mr. Gilbert Bayes, to whom the President has conveyed an expression of the high appreciation of the Council for his successful representation of the chemist, whose figure also forms part of the design of the seal of the Institute. Mr. Bayes, who has taken a keen interest in the work, has presented the Institute with the first small-scale plaster study from which the figure was developed, and it has been placed in a suitable position on the Staff stairs.

Pending the internal finishing, the House Committee have approved designs prepared by the Architect for new furniture for the Council Room. The Committee have also decided on a scheme for hat and coat accommodation, and have given directions with reference to other details, such as the insurance of the lift and the boilers, and the provision of precautions against fire.

The Building Fund.—The Finance Committee have had before them estimates showing the position of the Building Fund, and they have also considered the general finances of the Institute. They are of opinion that a sum of £2,500 approximately is required to settle all accounts in respect of the building and equipment. Of this sum, however, £1,000 will eventually come to the Institute from the legacy of the late Edward Riley.

The Council trust that Fellows and Associates who are able to help will give what they can, so that the immediate liabilities of the Fund may be reduced as far as possible.

ERRATUM.

In the "List of Reagents for Analytical Purposes" issued by the Councils of the Institute of Chemistry and the Society of Public Analysts:

On page 7, under AMMONIUM CHLORIDE, in the 3rd line below *Tests*, the word "platinum" should be replaced by the word "porcelain."

Obituary.

JAMES WATSON AGNEW was killed in action in France on May 21st. Educated at Ayr Academy and the Glasgow High School, he received his scientific training at the Glasgow and West of Scotland Technical College—now the Royal Technical College, Glasgow—where he became Lecturer and Demonstrator in chemistry in 1907. Subsequently, he was appointed Lecturer in chemistry at St. Mungo's College, Glasgow, and in 1909 was made an Examiner in that subject to the Glasgow Royal Faculty of Surgeons and Physicians. He contributed several papers on organic chemistry to the Chemical Society and other societies, and was the author in collaboration with Dr. G. B. Neave of "An Introduction to Practical Chemistry." He was serving as a Lieutenant in the 1st Battalion Highland Light Infantry at the time of his death. He passed the Final Examination for the Associateship in 1906, and was elected a Fellow of the Institute in 1910.

JOHN JACOB BERINGER died at Camborne on March 27th, in his fifty-eighth year. He received his chemical training at the Royal School of Mines (1877—1880), and also at King's College, London, where he was for some time assistant to Professor Huntington. Later, he was appointed Lecturer to the Miners Association of Cornwall, and Public Analyst to the County of Cornwall. In 1882 he became Principal of the School of Mines at Camborne, where he remained until his death. He was the author of a standard text-book on assaying and of a number of pamphlets and papers, and was a recognised authority on all matters relating to the dressing and assaying of tin ores. His work exercised a decided influence in effecting improvements in the Cornish mining industry during the last thirty years. He was an Associate of the Royal School of Mines and was elected a Fellow of the Institute in 1887.

CHARLES BENJAMIN CASWELL died at Northfield, Birmingham, in his seventy-sixth year. Trained at the Birmingham and Midland Technical Institute from 1867 to 1870, he became Works Chemist to Messrs. Chance Bros., Birmingham, and remained there until 1873, when he left to take the post of Assistant to A. H. Allen, at Sheffield. Later, he entered the works of Messrs. J. and E. Sturge, Northfield, Birmingham, with whom he remained for over forty years. He was elected a Fellow of the Institute in 1878.

SIR ARTHUR HERBERT CHURCH died at Kew Gardens on May 31st, in his eighty-first year. He was educated at King's College, London, and the Royal College of Chemistry (1851), and also at Lincoln College, Oxford, where he took a First Class at the Natural Science School. In 1873 he became Professor of Chemistry in the Royal Agricultural College, Cirencester, and in 1879 was appointed Professor of Chemistry in the Royal Academy of Arts, later also becoming Lecturer in organic chemistry at the Royal Indian Engineering College, at Cooper's Hill, Staines. He wrote several books on agricultural chemistry, including a laboratory guide for Agricultural Students, and published the results of many researches, especially on the chemistry of painting. He was the discoverer of turacin, an animal pigment, and also of several mineral species, including the British cerium mineral. He was elected a Fellow of the Royal Society in 1888, received the K.C.V.O. in 1909, and was President of the Mineralogical Society for three years. He was an Original Fellow of the Institute and served as a Censor during the years 1880—1883.

MARTIN DECHAN died at Hawick on May 6th, in his sixty-third year. He taught chemistry at Galashiels and Selkirk, and at the Buccleuch Higher Grade School, Hawick, and was Public Analyst for the counties of Roxburgh and Selkirk, and Medicine Analyst to several Irish Unions. He was a Justice of the Peace and a member of the Town Council and School Board of Hawick. He was elected a Fellow of the Institute in 1888.

JOSEPH WALTER HARRIS died while on active service in France, on June 3rd, in his twenty-eighth year. He entered University College, Nottingham, in 1908, and obtained the degree of B.Sc. in 1913. On leaving College, he was appointed Chemist at the Shirebrook Colliery, near Mansfield, a position which he held until August last. At the time of his death he was serving as a Lieutenant in the 1st Lincolnshire Regiment. He qualified as an Associate of the Institute in 1914.

DAVID ALEXANDER LOUIS died in London on March 25th, in his fifty-ninth year. He entered the Royal School of Mines in 1876, and became research assistant to Edward Frankland, with whom he contributed several papers to the Chemical Society. In 1881 he left College, and was engaged during two years in dye works, silver-plating works, and as a lecturer. From 1882 to 1886 he was employed on agricultural research at Rothamsted, carrying out experiments under the direction of Sir John Bennet Lawes, some of the results of which are to be found in the Lawes and Gilbert papers. In 1886 he took up a mining appointment in the United States, returning to the Royal School of Mines to complete his metallurgical training. He gained much practical experience in Colorado and other States, which he supplemented later by further work in Germany and Italy. In 1891 he commenced practice as a consulting mining engineer and metallurgist in London, making periodic visits abroad to the American and European mining districts. In 1893 he became an assistant Examiner in Mining to the Board of Education, and in 1900 was appointed Professor of Mining to the Yorkshire College—now the University—Leeds. He took a prominent part in the Third International Petroleum Congress held in 1907 at Bucharest, and in 1910 was made Hon. Secretary to the Metallurgical Section of the Seventh International Congress of Applied Chemistry. He also visited at this time Egypt, Russia, Galicia and Roumania, as a petroleum mining engineer. Professor Louis was a well-known technological journalist, and was a constant contributor to many leading journals, serving since 1912 on the Publication Committee of the Journal of the Society of Chemical Industry. He was elected a Fellow of the Institute in 1887.

SIDNEY GEORGE RAWSON died at Surbiton on March 23rd. He was educated at Charterhouse School, the Royal College of Science, University College, London, and University College—now the University—Liverpool taking the degree of D.Sc. in 1889. Subsequently, he became Lecturer in Chemistry at University College, Liverpool, and in 1895 was appointed Principal of the Technical College, Huddersfield. In 1903 he became Director of Education to the Worcestershire County Council, and, in 1907, Principal of the Battersea Polytechnic, London. Since January, 1914, he had also been Chairman of the Council of the Association of Technical Institutions. He was elected a Fellow of the Institute in 1887.

WILLIAM JAMES SELL died at Cambridge on March 7th, in his sixty-ninth year. In 1862 he became assistant in the Chemical Laboratory at St. John's College, Cambridge, at that time the only laboratory in the University open to undergraduates. He entered Christ's College in 1870,

and shortly after matriculated in the University. In 1876 he obtained a First Class with Honours in Chemistry at the National Science Tripos for the B.A. Degree, and later was appointed principal Demonstrator in Chemistry, a position which he held at the time of his death. He was elected a Fellow of the Royal Society in 1900, and took the degree of Sc.D. at Cambridge in 1906. Dr. Sell carried out many original investigations, his best-known work being that on pyridine derivatives, to which he was led by a study of citrazinic acid. He obtained from pyridine eight distinct chloro-derivatives, and was able to determine the chemical constitution of the new compounds. He also carried out research on the colloid solutions of phosphates, and contributed many papers to the Chemical Society from 1892 onwards. He was elected a Fellow of the Institute in 1878.

HERBERT SPARGO died at Lancaster Gate, London, on February 1st, in his fifty-first year. He entered the Durham College of Science, Newcastle-on-Tyne, in 1884, remaining there until October, 1887, when he went to the School of the Pharmaceutical Society and studied under Professors Atfield and Dunstan. Subsequently he obtained a post as assistant in the laboratory of Messrs. Brady and Martin, Newcastle-on-Tyne. In 1897 he went out to Johannesburg, and acted as chemist and metallurgist to several mining companies, becoming in 1903 chemist to the Jubilee and Salisbury Gold Mines. In 1906 he was appointed chemist to the Ashanti Gold Mines Co., Ltd., with which he remained for four years, and was then a year with the Toro Tin Co., Northern Nigeria, and a year with the Kuskie Tin Co., also in Northern Nigeria. He died shortly after his return to England early in the present year. He was elected a Fellow of the Institute in 1892.

ROBERT WILLIAMSON died at Tynemouth on September 24th last, in his sixty-second year. He studied chemistry and physics at the Royal College of Chemistry under Frankland and Guthrie for two years (1872-3), and subsequently became assistant to Perkin, with whom he remained for four years, publishing a paper, which he read before the Chemical Society, entitled "Some New Metallic Derivatives of Coumarin." In 1877 he obtained an appointment at Messrs. Nelson and Sons', of Warwick, where he was engaged on researches in connection with gelatin. He was, in turn, chemist to Messrs. Burt, Boulton and Heywood, at Silvertown, in charge of the anthraquinone process; chemist to Messrs. Hardman & Co., of Manchester, for whom he erected and managed works for the manufacture of alizarine; and chemist to Messrs. Sadler & Co., of Middlesbrough; and, finally, he established at Newcastle-on-Tyne, with Mr. W. Corder, a gelatine factory under the firm of Williamson and Corder. He was elected a Fellow of the Institute in 1878.

THOMAS WRIGHT was killed in action near Levantie, in France, on May 2nd, in his twenty-eighth year. He was educated at Lincoln Grammar School and at King's College, London, obtaining the degree of B.Sc. with First Class Honours in Chemistry in 1912. Early in 1913 he returned to the College as Demonstrator in chemistry, remaining there until the summer of 1914, when he was awarded one of the travelling scholarships on Sir Ernest Cassel's foundation. At the outbreak of war he was preparing to go to Germany for further study, but he was called up as a trooper in King Edward's Horse. In December, 1914, he received a commission in the Royal Berkshire Regiment, and was serving as a Second Lieutenant at the time of his death. He qualified as an Associate of the Institute in 1912.

Abstract of the Report of the Board of Examiners

ON THE
INTERMEDIATE AND FINAL EXAMINATIONS,
APRIL, 1915.

BOARD OF EXAMINERS.

Chairman : Sir James Johnston Dobbie, LL.D. (Glas.), D.Sc. (Edin.), F.R.S.,
President.

For the Intermediate Examination and in General Chemistry :

Arthur William Crossley, D.Sc. (Vict.), Ph.D. (Würzburg), F.R.S., F.I.C.
Harold Govett Colman, Ph.D. (Würzburg), M.Sc. (Vict.), F.I.C.

For the Final Examination :

- | | |
|---|---|
| (a) Mineral Chemistry | ... George Nevill Huntly, B.Sc., A.R.C.S.
(Lond.), F.I.C. |
| (b) Metallurgical Chemistry | ... Cecil Henry Desch, Ph.D. (Würzburg),
D.Sc. (Lond.), F.I.C. |
| (c) Physical Chemistry | ... Frederick George Donnan, M.A. (Q.U.B.),
Ph.D. (Leipzig), F.R.S., F.I.C. |
| (d) Organic Chemistry | ... William Jackson Pope, M.A. (Cantab.),
F.R.S., F.I.C. |
| (e) The Chemistry of Food and
Drugs, Fertilisers, and
Feeding Stuffs, Soils and
Water. | Bernard Dyer, D.Sc. (Lond.), F.I.C. |
| Therapeutics, Pharmaco-
logy and Microscopy. | Frederick Gowland Hopkins, D.Sc., M.B.
(Lond.), M.A. (Cantab.), F.R.S., F.I.C. |
| (f) Biological Chemistry, Bac-
teriology, Fermentation,
and Enzyme Action. | Alfred Chaston Chapman, F.I.C. |

The Examinations were held from April 12th to 16th in the new Laboratories of the Institute, except the practical part of the Examination in Branch (c), Physical Chemistry, which was conducted at University College, London.

Fifteen Candidates were examined. The results are shown in the following table :—

					NUMBER EXAMINED.		NUMBER PASSED.
Intermediate Examination	...	...	...	...	5	...	2
Final (A.I.C.) Examination :—							
Branch (c), Physical Chemistry	...	...	...	...	1	...	1
Branch (d), Organic Chemistry	...	...	...	...	3	...	2
Branch (e), Chemistry of Food and Drugs,							
etc.	...	...	...	...	6	...	5
					15	.	10

In addition to the above, one candidate who had previously presented himself for the Final Examination was required to take the written papers set for the Intermediate Examination to complete his examination in general chemistry, but he failed to satisfy the Board.

Intermediate Examination.—The Board report that the written work in the Intermediate Examination was up to the average standard, but the organic and qualitative practical work was very badly done, and the method of recording the results was careless and slovenly.

Final Examination.—The work of the Candidate in Branch (c) was in every way satisfactory.

In Branch (d) the Candidate who failed appeared to have had insufficient experience in organic practical work.

In Branch (e), of six Candidates only one failed. The practical work of those who passed was on the whole good. At the same time it should be recorded that, in the written part of the Examination, it would have been more satisfactory to have had better evidence than some of the Candidates showed of detailed familiarity with official and departmental literature bearing upon matters affecting the administration of the Sale of Food and Drugs Act.

The following Candidates passed the Intermediate Examination :

McEwan, Thomas Lawson	...	...	B.Sc. (St. Andrews). University College, Dundee.
Mendoza, Elias	...	...	Finsbury Technical College, London.

The following Candidates passed the Final Examination for the Associateship (A.I.C.).

In Branch (c), Physical Chemistry.

Rideal, Eric Keightley	B.A. (Cantab.), Ph.D. (Bonn). The University, Cambridge; and with Samuel Rideal, D.Sc., F.I.C.
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In Branch (d), Organic Chemistry.

Allen, William Stow	Finsbury Technical College, London; and under B. D. Porritt, B.Sc., F.I.C.
Harding, Gilbert	The Municipal School of Technology, Manchester.

In Branch (e), The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water.

Carlos, Arthur Sidney	...	...	B.Sc. (Lond.). Under C. A. Hackman, F.I.C., and A. H. M. Muter, F.I.C.
Hopkins, Reginald Haydn	...	...	B.Sc. (Birm.). The University, Birmingham; and under Professor A. Bostock Hill, M.D., M.Sc., F.I.C., and W. T. Rigby, F.I.C.
Legg, David Alliston	...	...	Finsbury Technical College, London.
Pearson, Archibald Ramsden	...	...	A.R.C.S., B.Sc. (Lond.). Royal College of Science, London; and at the Government Laboratory, London.
Stokes, George Alfred	...	...	Finsbury Technical College, London; and under A. W. Stokes, F.I.C.

The following papers were given :

Intermediate Examination.

GENERAL AND THEORETICAL CHEMISTRY.

TUESDAY, APRIL 13th, 1915: 10 a.m. to 1 p.m.

(*The Candidate is expected to attempt all the questions.*)

1. Discuss the structure and the general nature of the chemical reactions occurring in a flame of coal gas, (a) burning freely in the air, (b) burning in a Bunsen burner.

2. How may hydrogen be prepared in large quantity? What uses of this gas have rendered essential the investigation of its preparation on a commercial scale?

3. Give an account of the manufacture of fuming sulphuric acid and concentrated sulphuric acid, in which a catalyst is employed. Discuss the thermochemical relations of sulphur and oxygen and their bearing in the above manufacturing process.

4. Explain carefully the reactions which may be employed for the qualitative and quantitative separation of cadmium and arsenic, iron and chromium, calcium and magnesium.

5. Describe the preparation of any four of the following substances and explain their principal uses: sodium thiosulphate, potassium cyanide, stannous chloride, borax, potassium ferrocyanide.

6. What are the chief sources of chromium compounds? Describe shortly the chemical behaviour of the more important compounds which this metal forms with oxygen and of the derivatives to which they give rise.

2 p.m. to 5 p.m.

(The Candidate is expected to attempt all the questions.)

1. Describe exactly how you would prepare a specimen of ethyl alcohol from cane sugar. What is the approximate composition of fusel oil and what other by-products are produced during alcoholic fermentation?

2. How are maleic and fumaric acids prepared and how are these two compounds related to each other in constitution?

3. What are the general methods used for the preparation of hydroxy acids? By what reactions is it possible to distinguish between α , β , and γ -hydroxy acids?

4. Starting from phenol, how would you prepare: (a) anisole, (b) salicylic acid, (c) orthonitrophenol?

5. Compare and contrast the chemical behaviour of aniline, pyridine and dimethylamine. How may a pure specimen of the latter substance be prepared?

6. It has recently been stated that "Coal is one of the most important raw materials at the disposal of the chemist." Indicate how far this statement is correct by briefly describing how coal is utilised as a raw material.

PRACTICAL CHEMISTRY.

WEDNESDAY, APRIL 14th, 1915: 10 a.m. to 4.30 p.m.

1. The substance, A, is a mixture of barium carbonate and barium chloride. Determine the amount of barium and of one of the acid radicals in the mixture and from your results calculate its composition.

2. Identify the substance dissolved in the solution, B, and take the specific gravity of the solution at the temperature of the tap water. (*Glucose, sucrose. One to each candidate.*)

THURSDAY, APRIL 15th, 1915: 10 a.m. to 4.30 p.m.

1. Identify the given organic substance, C, and prepare a derivative from it. (*Hippuric acid.*)

2. Make a full qualitative analysis of the mixture D. (*Barium nitrate, potassium bromide, zinc ferrocyanide; ammonium chloride, ferric alum, calcium tartrate. One mixture to each candidate.*)

FRIDAY, APRIL 16th, 1915 : 10 a.m. to 4.30 p.m.

1. E is a sample of iron ore used for gas purification, with which you are required to carry out the following determinations :—(a) Moisture at 100°; (b) Volatile matter on ignition; (c) Content of Fe_2O_3 and of SiO_2 .

Final Examinations for the Associateship.

Branch (c).—Physical Chemistry.

MONDAY, APRIL 12th, 1915 : 10 a.m. to 1 p.m.

(Four questions only to be attempted.)

1. Explain in detail how the true ratio of the molecular weights of two gases (say hydrogen and oxygen) can be calculated from measurements of densities and compressibilities.

2. Discuss recent work and views on the deviation of electrolytes from the simple law first proposed by Ostwald and Planck.

3. Give some account of the views propounded by Fajans and Soddy with regard to the nature and classification of the radioactive elements and their products. How far have these views received experimental justification?

4. The following results have been obtained for the distribution of 1, 3, 5-dinitrobenzoic acid between water and benzene :—

$C_w \times 10^3$	.	.	.	6.258	4.794	3.727	1.608	1.009
$C_b \times 10^3$	.	.	.	8.676	6.473	4.686	1.982	1.120

Assuming the correctness of the data, what conclusions could you deduce therefrom?

(C_w and C_b denote the total concentrations in mols per litre of the acid in water and benzene respectively. The dissociation-constant of the acid in water at the same temperature is 1.60×10^{-5} .)

5. Write an essay on the synthetic production of ammonia from its elements, including an account of the technical production of the latter.

6. Give some account of the application of the physical chemistry of colloids to technical problems.

7. The E.M.F. at 18° of the reversible voltaic cell $\text{Cu} \mid \text{Cu}_2\text{O}, \text{NaOH aq.} \mid \text{H}_2$ is 0.461 volt, and its temperature coefficient—0.00066 volt per degree. Calculate the value in calories of the total energy change of the corresponding chemical reaction $\text{Cu}_2\text{O} + \text{H}_2 = 2 \text{Cu} + \text{H}_2\text{O}$.

8. Write an essay on the measurement of chemical affinity, including a short sketch of the historical development of this subject.

PRACTICAL.

TUESDAY, APRIL 13th, 1915 : 10 a.m. to 4.30 p.m.

Calibrate the given indicator by means of a hydrogen electrode.

WEDNESDAY, APRIL 14th, 1915 : 10 a.m. to 4.30 p.m.

Determine the value of $\frac{\Delta t}{\Delta p}$ for the given liquid in the neighbourhood of standard atmospheric pressure, t being the boiling point under pressure p .

THURSDAY, APRIL 15th, 1915 : 10 a.m. to 4.30 p.m.

Investigate the heat evolved on the addition of aqueous solutions of boric acid (about $\frac{1}{2}$ molar) to aqueous solutions of caustic soda. Plot the heat evolved as a function of the number of mols alkali added per mol boric acid, and discuss the meaning of the results so obtained.

FRIDAY, APRIL 16th, 1915 : 10 a.m. to 4 30 p.m.

Investigate the efficiency of various catalysts in accelerating the oxidation of ammonia gas by air to nitric acid or oxides of nitrogen at a red heat.

Branch (d).—Organic Chemistry.

MONDAY, APRIL 12th, 1915 : 10 a.m. to 1 p.m.

(The Candidate is expected to attempt all the questions.)

1. Give an account of our present knowledge of the ozonides.
2. State the more important reactions of the fatty and aromatic diazo-compounds. What evidence can you quote bearing upon the constitutions of the diazo-compounds?
3. Indicate the chief classes of fatty sulphur compounds, giving their principal methods of preparation and characteristic reactions.
4. How is phthalic acid prepared and what are its more important technical uses?
5. Describe some recent piece of synthetic work bearing upon the constitution of any particular class of naturally occurring alkaloids.

PRACTICAL.

**TUESDAY and WEDNESDAY, APRIL 13th and 14th, 1915 :
10 a.m. to 4.30 p.m.**

1. Ascertain the nature of the technical product, A. Purify the sample; prepare three pure organic substances from it and characterise them. (*Paramido phenol.*)

2. Determine the percentage of anthracene contained in the crude material, B.

**THURSDAY and FRIDAY, APRIL 15th and 16th, 1915 :
10 a.m. to 4.30 p.m.**

1. You are requested to prepare 15 grams of pure octaacetylsucrose.
2. Identify the acid and the base present in the mixture, C, and determine the percentage of each present. (*Benzoic acid and aniline.*)

**Branch (e). The Chemistry and Microscopy of Food and Drugs,
Fertilisers and Feeding Stuffs, Soils and Water.**

MONDAY, APRIL 12th, 1915 : 10 a.m. to 1 p.m.

1. Mention the purport of any recommendations contained in reports of official origin which would influence you in reporting on the contamination of articles of food or drink with arsenic, lead, or tin respectively.

2. Describe any application that occurs to you of the spectroscope in

medico-chemical analysis and in the examination of any article within the purview of the Sale of Food and Drugs Act.

3. Define very shortly the following terms: "amide," "amino-acid," "polypeptide," "peptone," "albumose," "protein."

What is understood by the term "albuminoids" as used under the Fertilisers and Feeding Stuffs Act? Discuss briefly the presumptive reasons for the adopted construction of the term and the relative importance or unimportance of its correctness or incorrectness in connection with different types of cattle food.

How, if required to do so, would you differentiate, in the analysis of a feeding stuff, between "albuminoids," as defined under the Act, and "true" albuminoids?

(Answer in a separate book.)

1. Describe exactly the methods you would employ in a systematic examination of viscera for the commoner mineral poisons.

2. Give some account of the action of picric acid and of the nitro-benzenes upon the human body. Discuss the various circumstances in which poisoning by these substances is apt to occur.

3. Enumerate the official preparations of the following alkaloids, mentioning in each case the limits of safe medicinal dosage: atropine, apomorphine, aconitine, codeine.

MONDAY, APRIL 12th, 1915: 2 p.m. to 5 p.m.

1. The fluid A represents a medicinal mixture meant to contain only bismuth carbonate and sodium bicarbonate. To it, however, potassium cyanide has been added. Demonstrate the presence of the latter by qualitative tests and also determine its amount. Decide whether an ounce dose of the mixture would be likely to produce fatal results.

2. Examine microscopically and report upon the deposit in the sample of water B. Make drawings of the structures which you identify.

3. Identify the microscopical preparations on the slides numbered 1 to 6.

Oral Examination in the Recognition of Drugs and Chemicals.

TUESDAY, APRIL 13th, 1915: 10 a.m. to 4.30 p.m.

1. Report on the genuineness or otherwise of the samples, A, tea, and B, Epsom salts.

2. Write out, on the forms supplied, certificates based on the results submitted to you of the analyses of three samples of milk.

WEDNESDAY, APRIL 14th, 1915: 10 a.m. to 4.30 p.m.

1. Examine the sample of margarine and report as to the legality of its composition. (You need not test for preservatives.)

2. Determine the percentage of boric acid in the sample of butter, and comment on the result.

THURSDAY, APRIL 15th, 1915: 10 a.m. to 4.30 p.m.

1. Make as full and as accurate a quantitative analysis as you can of the sample of potash salts, making all your determinations in duplicate.

(This exercise may be completed to-morrow.)

2. Examine microscopically the samples of linseed cake, "A" and "B" and report as to their genuineness.

FRIDAY, APRIL 16th, 1915: 10 a.m. to 4.30 p.m.

1. Complete the analysis of the potash salts begun yesterday.

2. The sherry submitted to you contains a poisonous alkaloid. Identify it and determine the quantity, expressing your results in grammes per litre and in grains per fluid ounce. (*Morphine*.)

Candidates for the Final Examination were required to translate passages from French and German technological literature.

TRANSLATION, APRIL 12TH, 1915.

Time allowed: $1\frac{1}{2}$ hours.

Translate into English.

Man lässt jetzt zu $\frac{1}{2}$ Liter dieser Lösung aus einer Bürette von der Schwefelnatriumlösung so lange zulaufen, als noch ein deutlicher Niederschlag entsteht, rührt alsdann tüchtig um, bringt mittelst des Glasstabes einige Tropfen der Flüssigkeit auf eine glatte weisse Porzellanplatte und setzt einen Tropfen reine verdünnte Nickelchlorürlösung in der Weise zu, dass er in die Mitte der auf der Porzellanplatte etwas ausgebreiteten Flüssigkeit kommt. Ist noch nicht alles Zink durch die Schwefelnatriumlösung gefällt, so bleibt der äussere Rand des Nickelchlorürtropfens blau oder grün, und in diesem Falle fährt man mit dem Zusatz von Schwefelnatrium fort unter zeitweisem Probiren, bis sich um den Rand des Nickelchlorürtropfens eine grauschwärzliche Färbung zeigt. Die Reaction ist alsdann beendet, alles Zink ausgefällt und etwas Schwefelnatrium im Ueberschuss. Die Stärke der Färbung des Nickelchlorürtropfens ist genau zu beachten, da sie bei den folgenden Versuchen als Anhaltspunkt dienen muss. Zur Ueberzeugung, dass alles Zink ausgefällt ist, kann man einige Zehntel-Cubikcentimeter Schwefelnatriumlösung mehr zusetzen, wodurch alsdann die Färbung des Nickelchlorürtropfens stärker schwarz werden muss. Man notirt die verbrauchten Cubikcentimeter Schwefelnatriumlösung und wiederholt den Versuch mit dem zweiten $\frac{1}{2}$ Liter der ammoniakalischen Lösung, indem man die nöthige Menge Schwefelnatriumlösung weniger 1 CC. auf einmal zulaufen lässt und hierauf je 0,2 CC. weiter zusetzt, bis die Endreaction erreicht ist. Der letztere Versuch gilt als der richtigere.—*C. R. Fresenius.*

OXALATE D'AMMONIAQUE.—Lorsque le sulfate de quinine est falsifié par l'oxalate d'ammoniaque, on peut arriver facilement à reconnaître ce dernier sel en traitant le mélange: 1° par la potasse, qui dégage des vapeurs ammoniacales sensibles à l'odorat, bleuisant le papier rouge de tournesol, et répandant des vapeurs blanches à l'approche d'une baguette de verre imprégnée d'acide azotique; 2° par une très petite quantité d'eau qui dissout l'oxalate d'ammoniaque et qui touche à peine au sulfate de quinine. L'eau qui provient de ce traitement fournit ensuite par la potasse, la soude ou la chaux, une odeur ammoniacale des plus sensibles, et avec un sel de chaux, un précipité blanc abondant d'oxalate calcaire.

ACIDE BENZOÏQUE.—Cette falsification peu probable, autrefois à cause de son prix élevé et actuellement à cause de son odeur caractéristique de

benjoin si l'acide a été extrait de ce baume, et urineuse s'il provient de la transformation de l'acide hippurique, serait reconnue en soumettant le mélange à une température de 146° dans une petite cornue : l'acide benzoïque se sublimera en lamelles cristallines qu'il sera facile d'étudier après cela en dissolvant ce sublimé dans l'alcool fort qu'on saturera ensuite de gaz acide chlorhydrique ; on produira ainsi de l'éther benzoïque d'odeur caractéristique, volatil, et que la potasse décompose en formant du benzoate de potasse.—*L. Heret.*

TRANSLATION, APRIL 14TH, 1915.

Time allowed : $1\frac{1}{2}$ hours.

Translate into English.

1. METHODEN DER AUFSCHLIESSUNG. (a) Verfahren von J. Blodget Britton. Man vermischt 0,5 Grm. des sehr fein pulverisirten Minerals auf das Innigste mit 4 Grm. eines Gemenges von 1 Thl. chloresauem Kali und 3 Thln. Natronkalk und erhitzt die Mischung mindestens $1\frac{1}{2}$ Stunden lang in einem bedeckten Platintiegel in heller Rothgluth. Die nicht geschmolzene Masse lässt sich leicht aus dem Tiegel lösen und zerreiben. Die Aufschliessung ist eine vollständige. Steigert man die Temperatur durch Anwendung des Gasgebläses, so lässt sich totale Aufschliessung schon in 20 Minuten erreichen (Fels). Die Schmelze enthält alles Chrom als chromsaures Alkali. Die Methode, eine Modification des Verfahrens von Calvert (welcher statt des chloresaueren Kalis salpetersaures Kali nimmt), ist einfach, sicher und, zumal sie sich im Platintiegel ausführen lässt, sehr empfehlenswerth.

(b) Methode von Kayser. Man mengt einen Theil (etwa 0,5 Grm.) des sehr fein gepulverten Chromeisensteins mit 2 Thln. wasserfreiem kohlen-saurem Natron und 3 Thln. Kalkhydrat und erhält das Gemenge im offenen Platintiegel unter öfterem Umrühren etwa eine Stunde lang über dem Gasgebläse in hellem Rothglühen. Es resultirt eine zusammengesinterte Masse, aus welcher sich das entstandene chromsaure Natron mit heissem Wasser leicht ausziehen lässt. Der Rückstand enthält bei guter Ausführung kein Chrom mehr.—*C. R. Fresenius.*

CARACTÈRES.—La farine de bonne qualité est d'un blanc jaunâtre, d'une odeur *sui generis*, d'un éclat vif, sans points rougeâtres, gris ou noirâtres. Sa saveur peut être comparée à celle de la colle de pâte fraîche. Elle est douce au toucher, sèche et pesante ; elle adhère aux doigts et forme une espèce de pelote lorsqu'on la comprime dans la main. Malaxée avec de l'eau, dont elle prend plus du tiers de son poids, elle doit faire *pâte longue*, homogène, élastique, non collante, extensible en nappes minces ; la farine est d'une qualité plus ou moins inférieure, selon que la pâte est plus ou moins *courte*.

La farine de moyenne qualité est d'un blanc mat et contient généralement plus de son ; si on la serre dans la main, elle s'échappe entièrement, à moins qu'elle ne provienne de blés humides.

VARIÉTÉS COMMERCIALES.—La valeur des farines varie avec la nature, la qualité et la provenance des blés qui les fournissent.

Les farines de blés durs sont généralement plus granuleuses, ou en poudre moins fine que les farines de blés demi-durs et tendres. Elles sont généralement aussi moins blanches, moins humides, plus faciles à conserver, absorbent plus d'eau, et rendent plus de pâte et de pain.—*L. Heret.*

The Register.

Since the publication of Proceedings, Part II., 1915, the Council have elected 1 Fellow and 8 new Associates; 6 Associates have been elected to the Fellowship, and 22 new Students have been admitted. The Institute has lost 10 Fellows, 2 Associates, and 1 Student by death.

New Fellow.

Friend, John Albert Newton, B.Sc. (Birm.), Ph.D. (Würzburg), Victoria Institute, Worcester.

Associates Elected to the Fellowship.

Davis, Eric Gordon, B.Sc. (Lond.).

Evans, Bernard Scott, B.Sc. (Lond.), 42, Keymer Road, Streatham Hill, London, S.W.

Hale, Arthur James, B.Sc. (Lond.), Finsbury Technical College, Leonard Street, City Road, London, E.C.

Nag, Professor Nagendra Chandra, M.A. (Calcutta), Agra College, Agra, India.

Roberts, Walter Morrell, M.Sc. (Mane.), 66, Hampton Road, Forest Gate, London, E.

Schotz, Schachno Peisach, B.Sc. (Lond.), D.Sc. tech. (Zürich), 23, Brunswick Square, London, W.C.

New Associates.

Allen, William Stow, 14, Gardner's Crescent, Edinburgh.

Carlos, Arthur Sidney, B.Sc. (Lond.), 42, Foxley Road, North Brixton, London, S.W.

Harding, Gilbert, 1, Holmewood Gardens, Brixton Hill, London, S.W.

Hopkins, Reginald Haydn, B.Sc. (Birm.), 320, Rotton Park Road, Birmingham.

Legg, David Alliston, Tintern, Mornington Road, Woodford Green, Essex.

Pearson, Archibald Ramsden, B.Sc., A.R.C.S. (Lond), The Government Laboratories, Clement's Inn Passage, London, W.C.

Rideal, Eric Keightley, B.A. (Cantab.), Ph.D. (Bonn.), 28, Victoria Street, London, S.W.

Stokes, George Alfred, 60, Parkhill Road, Hampstead, London, N.W.

New Students.

- Aitken, William Edington, 35, Argyle Crescent, Portobello, Edinburgh.
 Bagnall, Howard Henry, B.Sc. (Birm.), 21, Crosbie Road, Harborne, Birmingham.
 Bothamley, Richard Parkinson, Fernhurst, Gregory Boulevard, Nottingham.
 Butcher, Clarence Edward, Lynton, Southern Road, Fortis Road, London, N.W.
 Cohen, Enoch Henry, B.Sc. (Lond.), 21, Frederick Place, Bow, London, E.
 Ellison, Luke Ridley, 43, St. Leonard's Road, Clarendon Park, Leicester.
 Galletly, Charles Harvey, 960, Sauchiehall Street, Glasgow, W.
 Hall, Archibald John, 33, Kingstown Street, Regent's Park, London, N.W.
 Hopper, Isaac, Royal College of Science for Ireland, Dublin.
 Jones, Harold Bramfield, Broadway House, Northolme Road, Highbury, London, N.
 King, Frederick John, Oakhurst, Stanley Avenue, Wembley, Middlesex.
 Laxton, Frank Charles, High Street, Ely, Cambs.
 Löwensohn, Mathias Felix, 26, Stanley Street, Glasgow.
 Mardles, Ernest Walter John, 21, Nelson Road, Exeter.
 Nixon, Cyril John, Elmfield, Station Road, Harpenden, Herts.
 Nurse, Edwin Hart, Southwold, Lewis Road, Sutton, Surrey.
 Parkes, Hubert Alfred, 56, Laurence Lane, Old Hill, Staffs.
 Phillips, Sydney Bertram, 8, Milford Road, Harborne, Birmingham.
 Reeves, George, 22, St. Mary's Road, Chiswick, London, W.
 Reid, Douglas Montague, 33, Greenbank Crescent, Edinburgh.
 Smith, Francis Walter Hodges, 181, Belle Vue Road, Leeds.
 Wastell, Edgar Barker, 51, Gillott Road, Birmingham.

DEATHS.

Fellows.

- James Watson Agnew. (Killed in action.)
 John Jacob Beringer, A.R.S.M.
 Charles Benjamin Caswell.
 Sir Arthur Herbert Church, K.C.V.O., M.A., D.Sc. (Oxon.), F.R.S.
 Martin Dechan.
 David Alexander Louis, A.R.S.M.
 Sidney George Rawson, D.Sc. (Lond.).
 William James Sell, M.A., Sc.D. (Cantab.), F.R.S.
 Herbert Spargo.
 Robert Williamson.

Associates.

- Joseph Walter Harris, B.Sc. (Lond.). (Died on active service.)
 Thomas Wright, B.Sc. (Lond.). (Killed in action.)

Student.

- Leslie Phillipps Smith.

General Notices.

Examination in Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action : October, 1915.

An examination in Biological Chemistry, Bacteriology, etc., will commence on Monday, October 18th, 1915.

This examination will be open to Fellows and Associates, to candidates whose applications for admission to the Final Examination have been accepted by the Council, and to candidates who have passed the Intermediate Examination of the Institute, provided in each case that they produce evidence, satisfactory to the Council, of having taken a course in Elementary Biology, as defined in the Regulations.

The examination extends over five days, and may be theoretical and practical, and both written and oral. The syllabus includes Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action, with special reference to the Chemistry and Bacteriology of Food Stuffs, Water Supply, and Sewage Disposal, and the application of Biological Chemistry to Industries and Manufactures.

The list of candidates for this examination will close on Tuesday, September 14th, 1915.

Candidates intending to enter for this examination are recommended to study the following subjects :—

The morphology, physiology, and life history of bacteria, yeasts, and moulds, in their relation to food, water supply, the treatment of sewage, agriculture, and the fermentation industries. (A *special* study of pathogenic organisms is not demanded, but the candidate should acquire a knowledge

of such as are of importance in relation to food and to water supply.) Practical work should include :—(a) general bacteriological methods and preparation of pure cultures ; (b) microscopy : the staining and mounting of preparations, and the recognition of species ; (c) changes caused by micro-organisms. Enzymes and their actions. The proteins and their decomposition products. The methods employed in the examination and estimation of the carbo-hydrates. The chemistry of waters, sewage liquors and effluents. The chemistry of brewing and other fermentation industries.

Candidates are also advised to use every opportunity of becoming practically acquainted with the various technical problems which are dependent for their solution on a knowledge of Biological Chemistry, and to supplement their reading by visits to works such as breweries, dairies, tanneries, sewage works, and water works. As very few courses in biology or botany include any reference to the commoner organisms occurring in water and sewage, students are recommended to make their own observations in those departments of biological investigation.

Examinations in Chemical Technology, October, 1915.—The Chemical Technology Examination Board will be prepared to hold an examination in October next. The exact date will be announced later.

The list of Candidates will close on Tuesday, September 14th, 1915.

Full information can be obtained from the Registrar.

Notice to Associates.—Associates elected prior to June, 1912, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry for at least three years since their election to the Associateship, can obtain forms of application for election to the Fellowship.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in securing appointments for qualified chemists.

PRESENT POSITION OF THE BUILDING FUND.

	£	s.	d.	£	s.	d.
Estimated Total required ...				19,880	0	0
Total received or promised to date, including the £500 referred to above (<i>Actually</i> received : £16,127 13s. 6d.) ...	16,763	19	1			
Interest and Dividends ...	1,158	16	10			
	17,922	15	11			
Legacy under the Will of the late Edward Riley ...	1,000	0	0			
	18,922	15	11			
<i>Less</i> Incidental Expenses to date ...	265	4	6			
				18,657	11	5
				£1,222	8	7

The Finance Committee are of opinion that a sum of approximately £1,500 is now required to settle all accounts in respect of the building and equipment.

30, RUSSELL SQUARE,
LONDON, W.C.

August, 1915.

THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED. 1877.
INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,
1915.

PART IV.

PROCEEDINGS OF THE COUNCIL (JULY—OCTOBER, 1915).
ABSTRACTS OF THE REPORTS OF THE EXAMINERS:
INTERMEDIATE AND FINAL EXAMINATIONS, JUNE—JULY,
OCTOBER, 1915.
OBITUARY.
THE REGISTER.
NOTICES: JANUARY EXAMINATIONS; APPOINTMENTS
REGISTER; NOTICE TO ASSOCIATES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,
December, 1915.

Proceedings Committee, 1915-16.

E. W. VOELCKER (*Chairman*),
SIR JAMES J. DOBBIE (*President*),
LEONARD ARCHBUTT,
H. BALLANTYNE,
EDWARD J. BEVAN,
GEORGE EMBREY,
M. O. FORSTER,
H. R. LE SUEUR,
W. H. ROBERTS,
F. W. STODDART,
W. L. SUTTON.

Proceedings of the Council.

JULY—OCTOBER, 1915.

Death of Prof. Raphael Meldola, D.Sc., LL.D., F.R.S., Past-President (1912—1915).—The Council deeply regret to record the death of Prof. Meldola, which occurred suddenly on November 16th. They feel that all Fellows and Associates of the Institute will deplore the loss of a colleague so greatly esteemed and honoured alike for his work as a chemist and for his activity in many other fields of science. His death, occurring at the present time, is a great loss to the country.

Professional Chemists and the War.—The demand for the services of professional chemists in many matters connected with the war has steadily increased. The Institute has continued to be of assistance to the Government, and has received the thanks of the several departments concerned.

For the Ministry of Munitions, particulars have been obtained of over 500 qualified chemists, graduates and students, of whom many have received appointments in Government service.

With this Part of the Proceedings is published a supplementary list of Members, Students, and Candidates who are now with the forces. It will be observed that many are attached to the Royal Engineers. In the despatch of Sir John French, the Field-Marshal Commanding-in-Chief of the British Army in France, dated October 15th, 1915, the following paragraph referring to the Royal Engineers is, therefore, of special interest:—

“Owing to the repeated use by the enemy of asphyxiating gases in their attacks on our positions, I have been compelled to resort to similar methods; and a detachment was organised for this purpose, which took part in the operations commencing on the 25th September for the first time.

"Although the enemy was known to have been prepared for such reprisals, our gas attack met with marked success, and produced a demoralising effect in some of the opposing units, of which ample evidence was forthcoming in the captured trenches.

"The men who undertook this work carried out their unfamiliar duties during a heavy bombardment with conspicuous gallantry and coolness; and I feel confident in their ability to more than hold their own should the enemy again resort to this method of warfare."

Information has also been received that during the campaign against the rebels in South Africa and the Germans in South-West Africa, chemists were attached, on the personal order of General Botha, to the different brigades and rendered valuable assistance.

The Chemical Society.—The Council have already reported that, at the request of the Council of the Chemical Society, a Joint Committee of Fellows of the Institute and of the Society has been appointed to deal with matters relating to glass manufacture and hygiene and public health. This Committee has had several matters referred to them, and their reports have been adopted by the Councils of the Institute and of the Society.

Advisory Council on Scientific and Industrial Research.—In Proceedings, Part III., reference was made to the appointment of a committee of the Privy Council and of an Advisory Council constituted to deal with proposals for the initiation of researches, for establishing or developing institutions or departments of existing institutions for the scientific study of industrial problems, and for the establishment and award of Research Studentships and Fellowships. The Council of the Institute have received a communication from the Board of Education directing attention to the scheme for the organisation and development of scientific and industrial research recently published by the Government. (Cd. 8005) and requesting the co-operation of the Institute in that connection. Fellows and Associates are invited, therefore, to suggest suitable subjects for investigation under the scheme. The Council will be prepared to receive such suggestions and to forward them to the Advisory Council, but it is not proposed

at present to extend the work of the Institute itself in this direction beyond the problems relating to glass which may be referred to the Glass Research Committee.

Glass Research.—By direction of the Council of the Institute an application was addressed to the Advisory Council on Scientific and Industrial Research for a grant in aid of further research on glass. The appeal was based on the work already accomplished, on the experience obtained through that work, and on the knowledge gained of the needs of users of glass of various kinds. Attention was directed to the formulas published by the Institute for ordinary chemical laboratory ware, for resistance glass for various purposes, for combustion tubing, for miners' lamp glasses, and for X-ray bulbs, all of which are now being produced in Great Britain. Mention was also made of the fact that the Glass Research Committee of the Institute had the advantage of being in touch with experienced manufacturers, with whom they could discuss technical difficulties. It was pointed out that the expense of the investigations had hitherto been borne by the Institute and its voluntary workers, particularly Professor Jackson. Analyses of unusually intricate nature had been conducted without fee by Members of the Committee and their assistants, as well as by assistants paid by the Institute, while in the experiments conducted at King's College the Chemical Department had borne some expense for materials and for the gas and current required in working furnaces. The Committee indicated a number of additional glasses found to be in urgent demand, and showed that there was a need for investigation with regard to these and other forms of glass for scientific and domestic purposes.

After consultation with the Director of the National Physical Laboratory with reference to optical glass, the Committee suggested a scheme of additional work, and offered to pursue investigations in this direction if called upon to do so.

Sir William M'Cormick, Chairman of the Advisory Council on Scientific and Industrial Research, Dr. H. F. Heath, C.B.,

of the Board of Education, and Mr. S. H. Wood, Assistant Secretary of the Advisory Council, visited the Institute on 19th November, when they met the Council and the Glass Research Committee. Sir William M'Cormick promised that the appeal would receive careful consideration.

Since the publication of Proceedings, Part III., the Committee have received from Professor Jackson and Mr. Merton alternative formulas to Nos. 1 and 10. These are numbered 13 and 14 respectively, and particulars are here given.

	Parts.	
(13)		This formula was tried on the
Sand	45.35	laboratory scale independently by
Potash felspar	32.50	two workers. It gives a glass fining
Sodium carbonate (Na_2CO_3)	29.10	easily and quite free from seeds. It
Calcium carbonate (CaCO_3)	11.20	is a better working glass than No. 1,
		and should be much cheaper.

A further formula for soft soda glass of fine working quality and suitable for tubing, X-ray bulbs, etc., is given below:—

	Parts.	
(14)		The amount of felspar present is
Sand	54.5	sufficient to give four parts of alumina
Potash felspar	20.0	(Al_2O_3). The rest of the ingredients
Potassium carbonate (K_2CO_3)	7.2	are adjusted to give the same composition
Sodium carbonate (Na_2CO_3)	25.0	as No. 11, the adjustment being
Calcium carbonate (CaCO_3)	12.5	based on analysis of the felspar used.

The object of the above formulas is to avoid the use of alumina, the cost of which has considerably advanced. Potash felspar, which has been introduced, costs much less, and is easily obtainable.

It is understood that at least three manufacturing firms are now taking steps to produce supplies of all ordinary kinds of chemical laboratory ware in large quantity.

A letter has been received from Messrs. Baird and Tatlock (London), Ltd., expressing their appreciation of the work of the Glass Research Committee in connection with the production of chemical glassware and stating that the formulas published by the Committee have been of considerable assistance to them.

To encourage the production of British glass and porcelain

laboratory ware, filter paper, reagents and instruments, the Council of the Institute have decided to accept advertisements from British firms, and to issue them with the Proceedings of the Institute.

The Council repeat their earnest hope that all users will support home manufacturers not only now, but after the war, and abstain from ordering foreign products.

Ministry of Munitions.—The Comptroller of Munitions Inventions desires that Fellows and Associates of the Institute should be invited to submit ideas, suggestions, and inventions for appliances in connection with the prosecution of the war for the consideration of an Advisory Panel of scientific and other experts appointed by the Minister of Munitions. The Comptroller will be glad to receive suggestions with regard to the simplification of and improvements in either the processes of manufacture or the material of existing munitions, or indeed in any other respect.

Commercial Intelligence Department of the Board of Trade.—The attention of the Institute has been directed by this Department to the conditions governing the competitions organised by the Russian Ministry of Finance in respect of (1) methods of utilising spirit or alcohol or their products, and (2) new substances for denaturing spirit or alcohol for industrial purposes.

Prizes of 60,000, 30,000, and 10,000 roubles, respectively, will be awarded for the invention of a novel means of adapting alcohol for the preparation of such a product as shall by its nature absolutely differ from the spirit from which it is made, *e.g.*, vinegar, ether, chloroform, &c. Three prizes of 50,000, 20,000, and 5,000 roubles, respectively, will be awarded for the invention of a novel method of utilising spirit for the preparation of a product (*e.g.*, a pharmaceutical or perfumery preparation) of which spirit or its products (sulphuric ether, &c.) will appear as one of its component parts or dissolvent, provided that spirit cannot be extracted profitably from the product. Three prizes of 30,000, 15,000, and 5,000 roubles, respectively,

will be awarded for the invention of a novel method of utilising spirit in productions where spirit or its products would serve as temporary intermediary solvents of either of the extracted or precipitated materials, e.g., in the manufacture of smokeless powder, artificial silk, &c. Further prizes ranging from 75,000 to 5,000 roubles will be awarded for the invention or perfection of apparatus for the utilisation of spirit as motive power, fuel, or illuminant.

The search for new substances for denaturing spirit or alcohol is being organised with the object of extending the use of spirit for technical purposes, and accordingly three prizes of 30,000, 15,000, and 5,000 roubles, respectively, are offered for finding novel denaturing materials for improving the existing methods of denaturing, which, whilst guaranteeing the free use of denatured spirit, would obviate any possibility of using it as a beverage.

Applications in respect of both of these competitions should be addressed to "L'Administration Générale des Impôts Indirects et du Monopole de l'Alcool," Tutchkoff Naberezhnaia, Petrograd, not later than 1st/14th January, 1916, and must be accompanied by samples. Such applications should be made in the Russian or French languages and be enclosed in a special envelope bearing an inscription or device of some sort, the name and address of the applicant being submitted under separate cover bearing the same inscription or mark.

Inventors may reserve the right of benefiting by their inventions and of protecting themselves with letters patent.

Copies of the full text of the conditions for participating in the two competitions above referred to may be obtained by United Kingdom firms interested on application to the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

Examinations.—The Council have received the Report of the Board of Examiners on the June/July Examinations, an abstract of which is given on pp. 11–21 of this Part of the Proceedings.

The thanks of the Council have been accorded to the Governors of the Royal Technical College, Glasgow, and the Department of Agriculture and Technical Instruction for Ireland, for the use of examination rooms and laboratories, and to Professors G. G. Henderson and G. T. Morgan for their courtesy in this connection. Thanks have also been accorded to Professors Henderson, Alfred Campion, C. H. Desch, and G. T. Morgan, for supervising local examinations.

The Council have also received the Report of the Board on the Biological Examination held from October 25th to 29th (see p. 22).

The Council give notice that Examinations will not be held after January, 1916, until further notice.

Appointments Register.—Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in securing appointments for qualified professional chemists.

The Building Fund.—The Council appeal to Fellows and Associates who are able to assist in the completion of the Building Fund to give what they can, so that the immediate liabilities of the Institute may be reduced as far as possible (see p. 31).

The Register, 1915.—In view of the large number of Fellows, Associates, and Students engaged with the forces and in other Government work, and having regard to the need for exercising economy, the Council have decided not to publish the Register this year.

Obituary.

JOHN LOVE STRATHEARN ALLAN was killed in action in France on September 25th, in his twenty-sixth year. Educated at the Giggleswick School and at Paisley Technical College, he received his scientific training at the Glasgow and West of Scotland Technical College—now the Royal Technical College, Glasgow—and qualified as an Associate of the Institute in 1912. At the outbreak of war he was engaged as Chemist at the Glenfield Starch Works, Paisley, and at the time of his death was serving as a Second Lieutenant in the 7th Battalion of the King's Own Scottish Borderers.

VIVIAN BYAM LEWES died on October 23rd at Mold, Flintshire. Born in 1852, he was educated at University College School, and became assistant first to Dr. F. S. Barff, in 1868, and two years later to Professor A. W. Williamson at University College, London. Subsequently he worked under Dr. C. Graham in the Birkbeck Laboratory, until his appointment in 1888 as an assistant at the Royal Naval College, Greenwich, where he succeeded Dr. H. Debus as Professor of Chemistry, a post which he held for twenty-six years. In 1892 Professor Lewes was appointed chief superintending gas examiner to the Corporation of the City of London. He was also a lecturer under the Gilchrist Educational Trust, delivered several Cantor Lectures before the Royal Society of Arts, and lectures under the Technical Education Committee of the London County Council. He was a Vice-President of the Institution of Naval Architects, and was awarded its first gold medal for a paper on "The Formation of Boiler Incrustations and Oily Deposits." He published an important research in connection with the action of heat on hydrocarbons and the cause of the luminosity of flames, and contributed papers on these subjects—together with a work on pentathionates—to the Proceedings of the Royal Society during the years 1893-5. He was the author of several important papers on the corrosion of metals, anti-fouling compositions and the spontaneous ignition of coal, and also read a number of papers on coal gas before the Institute of Gas Engineers and other similar societies. He was the author of several books, including "Acetylene," which is a standard work of reference, "Service Chemistry," now in its fourth edition, "Liquid and Gaseous Fuel," and "The Carbonisation of Coal." He was elected a Fellow of the Institute in 1887.

GEORGE EVANSTON SMITH, a Registered Student of the Institute, entered the Royal Technical College, Glasgow, in April, 1912. He obtained a commission as a Second Lieutenant in the 3rd Battalion of the Argyll and Sutherland Highlanders in September, 1914, and was killed in action on September 25th, 1915.

Abstract of the Report of the Board of Examiners

ON THE

INTERMEDIATE AND FINAL EXAMINATIONS, JUNE—JULY, 1915.

BOARD OF EXAMINERS.

Chairman: Sir James Johnston Dobbie, LL.D., D.Sc., F.R.S., F.I.C.,
President.

For the Intermediate Examination and in General Chemistry:

Harold Govett Colman, Ph.D., M.Sc., F.I.C.
Arthur Harden, D.Sc., Ph.D., F.R.S., F.I.C.

For the Final Examination:

- | | |
|--|--|
| (a) Mineral Chemistry ... | George Nevill Huntly, B.Sc., A.R.C.S.,
F.I.C. |
| (b) Metallurgical Chemistry | Cecil Henry Desch, Ph.D., D.Sc., F.I.C. |
| (c) Physical Chemistry ... | Frederick George Donnau, M.A., Ph.D.,
F.R.S., F.I.C. |
| (d) Organic Chemistry ... | William Jackson Pope, M.A., F.R.S.,
F.I.C. |
| (e) The Chemistry of Food
and Drugs, Fertilisers,
and Feeding Stuffs,
Soils, and Water
Therapeutics, Pharma-
cology and Micro-
scopy | Bernard Dyer, D.Sc., F.I.C.

Frederick Gowland Hopkins, D.Sc.,
M.B., M.A., F.R.S., F.I.C. |
| (f) Biological Chemistry,
Bacteriology, Fermen-
tation, and Enzyme
Action | Alfred Chaston Chapman, F.I.C. |

The Examinations were held at the places and on the dates mentioned below :—

Intermediate Examination : At the Institute and at the Royal Technical College, Glasgow, July 6th to 9th.

Final Examination: Branch (*a*)—at the Institute, July 12th to 16th; Branch (*b*)—at the Royal Technical College, Glasgow, July 5th to 9th; Branch (*d*)—at the Royal College of Science for Ireland, Dublin, June 28th to July 2nd, and at the Institute and at the Royal Technical College, Glasgow, July 5th to 9th; Branch (*e*)—at the Institute, July 12th to 16th.

The results are shown in the following table :—

				NUMBER EXAMINED		NUMBER PASSED.
Intermediate Examination	...	...	...	11	...	7
Final (A.I.C.) Examination :—						
General Examination	...	...	...	1	...	1
Branch (<i>a</i>) Mineral Chemistry	...	...	...	2	...	1
Branch (<i>b</i>) Metallurgical Chemistry	...	...	...	1	...	0
Branch (<i>d</i>) Organic Chemistry	...	...	...	14	...	9
Branch (<i>e</i>) Chemistry of Food and Drugs,						
etc.	...	...	...	6	...	5
				35		23

In addition to the above, one candidate who had previously presented himself for the Final Examination was required to take the written papers set for the Intermediate, to complete his examination in general chemistry, and satisfied the Board.

Intermediate Examination. The paper work of the candidates who passed was decidedly good, and the practical work, both inorganic and organic, was quite satisfactory, though most of the candidates have still to learn how to record their results in a clear, concise and intelligible manner.

Final Examination. In Branch (*a*) there was a lack of initiative in attacking practical exercises. Instead of dealing with each problem on its merits, there was a tendency to pick out one of the text-book methods which seemed to meet the case and use it without modification.

In Branch (*b*) neither the practical nor the written work came up to the standard to be expected of an Associate of the Institute.

In Branch (d) the Candidates who were rejected failed to satisfy the Examiners in their written work; the majority of them showed the need for further experience in practical work, and some a lack of cleanliness and neatness in laboratory preparations.

In Branch (e) the work of the Candidates was generally good throughout the Examination.

The following Candidates passed the Intermediate Examination :

Cortfield, Charles Edwin	...	...	...	School of the Pharmaceutical Society; and King's College, London.
Hancock, Algie	...	...	...	University College, Nottingham.
Hopkins, Thomas	...	...	...	B.Sc. (Lond. and Wales). University College, Aberystwyth; and University College, Nottingham.
McLeod, Joseph	...	...	...	The Heriot-Watt College, Edinburgh.
Ogilvie, James	...	...	...	B.Sc. (Edin.). The Heriot-Watt College; and the University, Edinburgh.
Shore, Agnes	...	...	...	King's College, London; and the University, Leeds.
Stewart, Andrew	...	...	...	B.Sc. (Glas.). The University, Glasgow.

The following Candidate passed an Examination in General Chemistry for the Associateship (A.I.C.) :

Taylor, Edgar Reuben	A.R.S.M. Royal College of Science; and Royal School of Mines, London.
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The following Candidates passed the Final Examination for the Associateship (A.I.C.) :

In Branch (a), Mineral Chemistry.

Arundel, Edgar	B.Sc. (Lond.). University College, London.
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In Branch (d), Organic Chemistry.

Bennett, George Macdonald	B.A., B.Sc. (Lond.). East London College, London; and the University, Cambridge.
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Boyd, Alexander John	The Heriot-Watt College, and the University, Edinburgh; with J. Falconer King, F.I.C.; and King's College, London.
Denington, Richard Charles	...	...	...	East London College, and the Royal College of Science, London.
Hepworth, Harry	...	...	...	B.Sc. (Lond.). University College, Nottingham.
Hopper, Isaac	...	...	...	A.R.C.S.I. Royal College of Science for Ireland, Dublin.
Hutchison, George Lewis	...	...	...	B.Sc. (Lond.). University College, London.
Lumsden, Colin Henry	...	...	...	B.Sc. (Lond.). East London College, London.
Porter, James Walker	...	...	...	A.R.C.S.I. Royal College of Science for Ireland, Dublin.
Tucker, Stanley Horwood	...	...	...	B.Sc., A.R.C.S. (Lond.). Royal College of Science; with George Senter, D.Sc., Ph.D., F.I.C.; and the Govt. Laboratory, London.

In Branch (c), The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water.

Bracewell, Geoffrey Alfred	...	...	...	The University, Leeds; and with F. W. Richardson, F.I.C.
Cheng, Pinzen	...	...	...	B.Sc. (Birm.). The University, Edinburgh, and the University, Birmingham; and with C. E. Sage, F.I.C.
Jones, Alfred Owen	...	...	...	University College, London.
Manley, Cyril Hubert	...	...	...	B.A. (Oxon.). The University, Oxford; and with W. W. Fisher, M.A., F.I.C.
Roberts, Caryl Cameron	...	...	...	M.A. (Cantab.). The University, Cambridge; and with S. Harvey, F.I.C., and E. M. Hawkins, F.I.C.

The following Candidate who had entered in Branch (c) in January, 1915, completed his Examination in General Chemistry and satisfied the Board.

Ensley, Sydney	B.Sc. (Vici.). The University, Manchester.
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PAPERS AND EXERCISES SET AT THE JUNE
JULY EXAMINATIONS, 1915.

Intermediate Examination.

GENERAL AND THEORETICAL CHEMISTRY.

[LONDON AND GLASGOW.

TUESDAY, JULY 6th, 1915: 10 a.m. to 1 p.m.

(Candidates are expected to attempt all the questions.)

1. Describe the reactions by which you would convert the nitrogen contained in ammonia gas into the state of combination found in a primary amine, a cyanide, an isocyanide and an amide respectively.

2. Give an account of the various uses of potassium hydroxide as a reagent in organic chemistry. In which of the reactions you mention may sodium hydroxide be employed with equal success?

3. What are the oxidation products of acetone, oxalic acid, formic acid, toluene and aniline? Describe how the oxidation may be brought about in each case.

4. How may the following substances be prepared from benzene as a starting point: Hippuric Acid, Benzaldehyde, Salicylic Acid, Benzoyl Chloride?

5. Compare and contrast the properties of (a) benzene and pyridine, (b) the mono-substituted derivatives of benzene and pyridine.

6. Write the structural formulæ of any three amino-acids (other than aminoacetic acid) formed as degradation products of natural substances, and indicate how any two of these acids could be prepared synthetically. How may polypeptides be obtained from amino-acids?

2 p.m. to 5 p.m.

(Candidates are expected to attempt all the questions.)

1. Mention four non-metallic elements which occur in nature in the uncombined state. Give the names and formulæ of one natural compound of each of the elements you mention, and state how the elementary substances could be obtained from these compounds.

2. How may the following substances be prepared in a pure condition, and how may their purity be established: mercurous chloride from mercury; sodium thiosulphate from sulphur; ammonium iodide from iodine; sodium chloride from rock salt?

3. Describe the preparation of hydrazine sulphate and free hydrazine, and give a short account of the properties of hydrazine and its salts.

4. How would you determine the percentage composition of a gaseous mixture containing carbon dioxide, carbon monoxide, methane and hydrogen?

5. How would you prepare in the laboratory a specimen of pure bismuth from the commercial substance containing silver, copper, arsenic and tellurium? By what reactions may bismuth salts be distinguished from antimony salts?

6. Indicate in what manner determinations of the specific heat of (a) gases, (b) solids, are of value to the chemist. Carefully describe how the specific heat of a solid may be determined.

PRACTICAL CHEMISTRY.

WEDNESDAY, JULY 7th, 1915: 10 a.m. to 4.30 p.m.

1. The solution A contains ammonium chloride, potassium chloride and potassium sulphate. Carry out such quantitative determinations as will enable you to calculate the number of grams per 100 c.c. of each salt present in the solution.

2. Investigate the definite inorganic substances B and C. (Mercuric amido chloride, potassium cobalticyanide.)

THURSDAY, JULY 8th, 1915: 10 a.m. to 4.30 p.m.

1. The liquid D is a mixture of phenol with an aromatic base. Separate the latter by a method involving steam distillation, and determine the boiling point of the separated base. Prepare the acetyl-derivative of the base, and ascertain its melting point.

2. Make a qualitative examination of the mixture of two inorganic salts, E. (Antimony oxychloride, lead nitrate; cadmium bromide, barium phosphate. One mixture to each candidate.)

FRIDAY, JULY 9th, 1915: 10 a.m. to 4.30 p.m.

F is an adulterated sample of red lead. Determine the percentage of lead in the sample, and the nature and percentage of the adulterant. (Barium sulphate.)

Final Examinations for the Associateship.

Branch (a).—Mineral Chemistry.

LONDON.

MONDAY, JULY 12th, 1915: 10 a.m. to 1 p.m.

1. Discuss the methods which have been proposed for obtaining pure dry iodine. Describe in detail a rapid method for obtaining small quantities of iodine containing less than 0.1% of impurity.

2. Give a general account of atomic weight determinations based on gas density and gas volumetric methods. Give full details for one element.

3. Describe the preparation and properties of ternary compounds containing nitrogen, oxygen and hydrogen capable of forming salts.

4. Name the chief sources of tungsten and its uses. Describe the preparation of tungsten and sodium tungstate from its more abundant ores.

5. Give a scheme for the analysis of an aluminium alloy containing (in 3%) copper 2.5%, lead 0.3%, zinc 12.5%, nickel 2% and the iron and silicon present in commercial aluminium.

6. Write an essay on one of the following:—

(a) The variation of the atomic weight of lead according to its source, discussed from the experimental and theoretical points of view.

(b) The industrial applications of the "rare" metals.

(c) The bearing of colloidal phenomena on analytical chemistry.

TUESDAY and WEDNESDAY, JULY 13th and 14th, 1915 :

10 a.m. to 4.30 p.m.

1. Report on the inorganic constituents of the filter cloth, and on its suitability for removing dust from gas at temperatures slightly over 100° C.
2. Determine the nature and amount of the two constituents in the aqueous solution B. (Hydroxylamine and ammonium sulphates.)

THURSDAY and FRIDAY, JULY 15th and 16th, 1915 :

10 a.m. to 4.30 p.m.

1. Prepare a specimen of potassium iodate and prove its purity by analysis.
2. Determine the metals in D. (Iron, nickel and titanium.)

Branch (b).—Metallurgical Chemistry.

GLASGOW.

MONDAY, JULY 5th, 1915 : 10 a.m. to 1 p.m.

(Six questions only to be attempted.)

1. Give an outline of the conversion of pig iron into steel by the basic Bessemer process. What quality of pig iron is suitable for treatment, and what are the principal chemical reactions involved ?
2. How does the introduction of steam affect the working of a gas producer ? What chemical reactions take place (a) in the producer, (b) in the regenerator, assuming that the material used is coke ?
3. What is the nature of the "flotation" processes now often used in the concentration of ores ? Describe the separation of minerals by flotation in any case known to you.
4. Give some account of the processes employed in the manufacture of ductile tungsten, and state the principal properties and uses of this metal.
5. How is copper extracted from the burnt pyrites of sulphuric acid works ? What other valuable products are obtained in the process ?
6. Describe some form of electric induction furnace, and mention its principal applications.
7. How does the electrical conductivity of alloys depend on their constitution ? What type of alloy would you select for the construction of standard resistance coils, and why ?
8. Describe two methods of determining high temperatures in metallurgical operations, one being suitable for temperatures from 500° to 1,000°, and the other from 1,200° to 1,800° C. Explain the principles on which they depend.

TUESDAY and WEDNESDAY, JULY 6th and 7th, 1915 : 10 a.m. to 4.30 p.m.

1. Determine the proportions of carbon, nickel, manganese, sulphur and phosphorus in the specimen of nickel steel.
2. Prepare a photo-micrograph of the specimen of bronze, and identify its constituents.

THURSDAY and FRIDAY, JULY 8th and 9th, 1915 :

10 a.m. to 4.30 p.m.

1. Estimate the lead, zinc and sulphur in the ore A, and report on its nature.
2. Assay the ore B for silver and gold.

Branch (d).—Organic Chemistry.

DUBLIN.

MONDAY, JUNE 28th, 1915 : 10 a.m. to 1 p.m.

(The Candidate is expected to attempt all the questions.)

1. State the experimental evidence which has led to the view that certain organic compounds contain tetravalent oxygen.
2. What conclusions have been arrived at concerning the relations between the numerical values of the rotation constants and the constitutions of optically active substances?
3. Give an account of the aliphatic nitro-compounds indicating the more important modes of preparation and reactions of these substances.
4. What methods are available for the replacement of hydrogen by methyl in organic compounds?
5. Describe how the constitution has been determined and the synthesis effected of *one* of the following substances: Nicotine, Berberine, Papaverine, Narcotine.

TUESDAY and WEDNESDAY, JUNE 29th and 30th, 1915 :

10 a.m. to 4.30 p.m.

1. You are provided with 50 grams of technical dinitrochlorobenzene. Purify the material and prepare from it three pure crystalline derivatives.
2. Establish the identity of the sulphonic acid contained in A by the preparation and analysis of suitable salts. (Sodium naphthionate.)

THURSDAY and FRIDAY, JULY 1st and 2nd, 1915 :

10 a.m. to 4.30 p.m.

1. Starting with 50 grams of phenol, prepare and hand in crystalline specimens of nitrosophenol and p-nitrophenol.
2. Estimate the percentage of the methoxyl radicle contained in the given alkaloid. (Brucine.)

LONDON AND GLASGOW.

MONDAY, JULY 5th, 1915 : 10 a.m. to 1 p.m.

(The Candidate is expected to attempt all the questions.)

1. What general methods are available for the preparation of the arsenic derivatives of the aromatic hydrocarbons? Which of these substances are of technical importance?
2. Write an essay on stereochemistry showing the results achieved in extending the conclusions arrived at concerning the space configurations of organic substances to chemical compounds in general.
3. How is guanidine prepared? What are the chief reactions of this substance and what important compounds can be prepared from it?
4. Give an account of the preparation and chief properties of the aromatic compounds containing iodine.
5. Describe how the constitution has been determined and the synthesis effected of *one* of the following substances: Dipentene, Camphor, Menthone.

TUESDAY and WEDNESDAY, JULY 6th and 7th, 1915 :

10 a.m. to 4.30 p.m.

1. You are provided with 50 grams of technical tolidine base. Purify the material and prepare from it three pure crystalline derivatives.
2. Establish the identity of the organic base contained in the given salt A, by the preparation and analysis of the corresponding platinumchloride. (Ethylamine hydrochloride.)

THURSDAY and FRIDAY, JULY 8th and 9th, 1915:

10 a.m. to 4.30 p.m.

1. Starting with 30 grams of aniline, prepare and hand in crystalline specimens of thiocarbanilide and triphenylguanidine.

2. Ascertain what alkaloids are contained in the given solution. (Morphine and quinine.)

Branch (e). The Chemistry and Microscopy of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water.

LONDON.

MONDAY, JULY 12th, 1915: 10 a.m. to 1 p.m.

1. Give a summary of the existing legal provisions or regulations (in this country) relating to milk and cream, as far as they relate to the work of the Public Analyst.

2. Explain how you would examine a sewage effluent to ascertain its fitness to be turned into a stream, and indicate the features which would specially influence your opinion.

3. Give a brief account of some of the distinctive properties of each of the following substances: (a) Cane Sugar, (b) Invert Sugar, (c) Dextrose, (d) Laevulose, (e) Maltose, (f) Lactose.

(Answer in a separate book.)

1. Enumerate the official preparations of opium which are liquid in form, giving the composition and medicinal dose of each. Describe the various colour tests for morphine and appraise their relative value. To what extent does the presence of putrefactive bases interfere with the detection of morphine?

2. Describe the symptoms of carbon monoxide poisoning and discuss the circumstances under which it may occur. What evidence would you rely upon in proof of poisoning by this gas?

3. Describe in full detail the technique of methods used in the identification of blood stains by the microscope.

2 p.m. to 5 p.m.

1. Test the sample of blood, A, for the presence of chloroform.

2. Prepare for microscopic examination (1) a specimen of haemin crystals, and (2) a characteristic sublimate of arsenic trioxide from arsenic present in the blood A.

3. Identify the starches present in the powder B.

*Oral Examination in the Recognition of Drugs and Chemicals.***TUESDAY, JULY 13th, 1915: 10 a.m. to 4.30 p.m.**

Make as complete an examination as you can of the sample of lard and report upon its genuineness. (Lard mixed with refined coconut fat.)

WEDNESDAY, JULY 14th, 1915: 10 a.m. to 4.30 p.m.

Examine the sample of beer for poisons. If you identify any poison, determine its approximate quantity. Make full notes of all your tests, including those giving negative results. (Oxalic acid.)

THURSDAY, JULY 15th, 1915: 10 a.m. to 4.30 p.m.

1. Determine the calcium phosphate and the nitrogen in the sample of bone meal, "A."

2. Ascertain the percentage of lecithin in the egg preparation, "B."

(The latter exercise may be finished to-morrow.)

FRIDAY, JULY 16th, 1915: 10 a.m. to 4.30 p.m.

1. Complete the determination in the egg preparation begun yesterday.
2. Examine and report as fully as you can upon the sample of glycerine. (Glycerine adulterated with sugar syrup.)

Candidates for the Final Examination were required to translate passages from French and German technological literature.

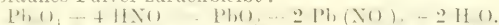
TRANSLATION, PAPER A.

Time allowed: $1\frac{1}{2}$ hours.

Translate into English.

(c) Mennige, Pb_3O_4 , Bleitetroxyd, Minium, Pariserrot, rotes Bleioxyd, Bleiminium, rotes Bleisuperoxyd, ist als Verbindung von Bleioxyd mit Bleisuperoxyd: $\text{Pb}_3\text{O}_4 = 2\text{PbO} + \text{PbO}_2$ aufzufassen. Man stellt es aus Massicot im Flammenofen bei 300° — 400° dar.

Prüfung: Gute Mennige muss hochrote Farbe zeigen, sehr fein und trocken sein, muss sich zwischen den Fingern wie Puder anfühlen lassen und unter der Lupe kleine glänzende Blättchen oder Schuppen zeigen. Behandelt man Mennige mit verdünnten Säuren, welche lösliche Bleisalze bilden, z. B. Salpetersäure, so wird Bleioxyd gelöst, während Bleiperoxyd als braunes Pulver zurückbleibt:



Eisessig löst 12—16 Teile reine Mennige vollständig auf. In verdünnter Salpetersäure unter Gegenwart von Oxalsäure ist Minium ebenfalls vollkommen löslich; durch Fällung dieser Lösung mit Schwefelsäure lässt sich der Bleigehalt bestimmen. Kautschukartikel, welche Mennige als Zusatz enthalten, zeigen Schwarzfärbung, starke Zunahme des spezifischen Gewichtes bei geringer Volumenvermehrung. Die Vulkanisation wird beschleunigt, zu weit gehende Vulkanisation wird durch Bindung von überschüssigem Schwefel innerhalb bestimmter Grenzen gehemmt. Eine gewisse Vorsicht ist jedoch zu beobachten, indem Mennige besonders bei der Trockenvulkanisation schädliche oxydierende Wirkung aufweist. Es tritt sogar manchmal Selbstentzündung des Gummis durch Sauerstoffabgabe ein.—*Ditmar.*

GÉNÉRALITÉS.—Lorsque Lavoisier eut démontré, par une expérience mémorable, que le diamant n'était que du carbone cristallisé, les essais de reproduction ne se firent pas attendre. Les recherches entreprises dans cette voie sont assez nombreuses, mais bien peu ont été conduites avec méthode et persévérance. Si nous en exceptons quelques Mémoires importants, nous verrons, par l'historique de la question, combien de choses contradictoires ou douteuses ont été publiées sur ce sujet. D'ailleurs, si le nombre des recherches a été très grand, celui des publications n'est pas aussi étendu que l'on pourrait le supposer tout d'abord. Cela tient sans doute à ce que beaucoup de chercheurs ont envisagé plutôt la reproduction du diamant que l'étude des différentes variétés allotropiques du carbone. Considérée sous ce point de vue, la question était incomplète.

En tenant compte de ces idées, nous avons voulu étudier, d'une façon aussi générale que possible, les trois variétés de carbone: carbone amorphe, graphite et diamant.

Dans les chapitres précédents, nous avons donné les résultats obtenus à propos des carbones amorphes et des graphites. Nous résumons, dans celui-ci, tout ce qui se rapporte au diamant.

Dès le début de nos recherches, nous étions bien convaincu que, s'il était possible de reproduire le diamant, les premiers cristaux obtenus

seraient microscopiques. Lorsque l'on compare le volume des cristaux de quartz que l'on rencontre dans la nature à celui des cristaux synthétiques obtenus par la belle méthode de M. Daubrée, on ne devait pas s'attendre à reproduire, dès le début d'une étude sur le carbone cristallisé, des diamants de plusieurs carats.—*Moissan*.

TRANSLATION, PAPER B.

Time allowed : 1½ hours.

Translate into English.

BESTIMMUNG ALS CHROMOXYD.—A. Man reducirt die Chromsäure zu Oxyd und bestimmt dieses. Die Reduction geschieht entweder, indem man die Auflösung mit Salzsäure und Alkohol erwärmt, indem man Schwefelwasserstoff in die mit Salzsäure versetzte Lösung leitet, oder indem man eine starke Lösung von schwefeliger Säure zumischt und gelinde erwärmt. —Bei concentrirten Lösungen wendet man meist die erste, bei verdünnten eine der letzteren Methoden an. In Bezug auf die erste ist zu bemerken, dass der Alkohol verjagt werden muss, bevor man das Chromoxyd mit Ammon fallen kann, in Bezug auf die zweite, dass man die mit Schwefelwasserstoff übersättigte Lösung so lange an einen gelinde warmen Ort stellt, bis sich der ausgeschiedene Schwefel abgesetzt hat. — Resultate genau, wenn man Sorge trägt, dass das Chromoxyd rein und nicht wie es beim Fällen der Chromoxydlösung durch Ammon in Glasgefässen stets der Fall durch Kieselsäure und Kalk verunreinigt ist.

B. Man fällt die neutrale oder durch Salpetersäure schwach saure Lösung mit salpetersaurem Quecksilberoxydul, filtrirt den entstandenen rothen Niederschlag von chromsaurem Quecksilberoxydul nach längerem Absitzen ab, wäscht ihn mit einer verdünnten Auflösung von salpetersaurem Quecksilberoxydul aus, trocknet, glüht und wägt das zurückbleibende Chromoxyd (H. Rose). Resultate genau.—*C. R. Fresenius*.

GÉNÉRALITÉS.—Le graphite, avant les recherches de M. Berthelot, n'était pas caractérisé en tant qu'espèce définie. Anciennement on réunissait sous le nom vague de *graphites* toutes les variétés de carbone capables de laisser, par le frottement sur le papier, une trace grise et brillante. A cette époque, la molybdénite pouvait être confondue avec le graphite.

En appliquant la curieuse réaction de Brodie à l'analyse d'un mélange des différentes variétés de carbone, M. Berthelot a pu donner du graphite la définition suivante : " Toute variété de carbone susceptible de fournir par oxydation un oxyde graphitique."

Cette propriété établissait définitivement la classification des carbones et les trois groupes, diamant, graphite et carbone amorphe, comprenaient, dès lors, tous les états de ce corps simple que l'on peut rencontrer dans la nature ou qui peuvent être produits par la main de l'homme.

L'oxyde graphitique s'obtient, le plus souvent, par la méthode de Brodie, en soumettant à chaud le graphite à l'action oxydante d'un mélange de chlorate de potassium et d'acide azotique. Il se forme un composé, le plus souvent cristallin, qui a la propriété de déflagrer par la chaleur en augmentant beaucoup de volume, et en laissant un résidu noir d'oxyde pyrographitique.

M. Berthelot a décrit, avec soin, les conditions de cette oxydation et l'a appliquée à l'étude des graphites autrefois connus.

J'ai étendu cette recherche à quelques graphites naturels et aux nombreux échantillons de graphite que j'ai pu obtenir, dans mes études sur la Chimie des hautes températures.—*Moissan*.

FINAL EXAMINATION IN BIOLOGICAL CHEMISTRY, BACTERIOLOGY, FERMENTATION, AND ENZYME ACTION.

OCTOBER, 1915.

The examination was held from October 25th to 29th, 1915; one Candidate presented himself, and failed to satisfy the Board.

The following papers and exercises were set :—

MONDAY, OCTOBER 25th, 10 a.m. to 1 p.m.

1. Give an account of the chemical activities of the following enzymes: Pepsin, trypsin, lipase, zymase.
2. Write a brief essay on bacterial activity in its relation to the growth of the higher plants.
3. Describe with all essential details the method you would adopt for preparing from a specimen of commercial yeast a pure culture of any one of the species present.
4. Criticise the expression "Ptomaine Poisoning" as used in connection with certain cases of poisoning caused by food.

TUESDAY, OCTOBER 26th, 10 a.m. to 4.30 p.m.

1. "A" is a material supplied for the souring of milk to be used for medicinal purposes. Examine and report on this preparation.
2. Make a general bacteriological examination of the sample of Water.

(These exercises will be continued to-morrow.)

WEDNESDAY, OCTOBER 27th, 10 a.m. to 4.30 p.m.

1. Continue the exercises of the previous day.
2. Compare the two samples of Malt Extract "A" and "B" in respect of their diastatic and proteolytic activities.

(These exercises will be continued to-morrow.)

THURSDAY, OCTOBER 28th, 10 a.m. to 4.30 p.m.

1. Continue the exercises of the previous days.
2. Examine the two samples of Beans "A" and "B" for the presence of a Cyanogenetic Glucoside. Report upon their suitability for human consumption.

(These exercises will be continued to-morrow.)

FRIDAY, OCTOBER 29th, 10 a.m. to 4.30 p.m.

Complete the previous exercises.

During the course of the examination, the Candidate was required to make microscopical preparations and to identify slides of typical organisms. The Candidate was also required to translate passages from French and German technical literature.

The Register.

Since the publication of Proceedings, Part III., 1915, the Council have elected 16 new Associates ; 11 Associates have been elected to the Fellowship, and 7 new Students have been admitted. The Institute has lost 3 Fellows, 1 Associate, and 1 Student by death.

Associates Elected to the Fellowship.

- Cardwell, David, M.Sc. (Vict.), 50, Alexandra Road South, Manchester, S.W.
 Elsdon, George Davidson, B.Sc. (Birm.), Municipal Chemical Laboratory,
 141, Regent Road, Salford.
 Evans, Edgar Charles, B.Sc. (Wales), South Wales and Monmouthshire
 School of Mines, Treforest, Glam.
 Gill, Harold Warren, B.Sc. (Lond.), South African School of Mines and
 Technology, Johannesburg, S. Africa.
 Hill, Edgar, A.R.C.S. (Lond.), 36, Mysore Road, Lavender Hill, London,
 S.W.
 Knapman, Percy George, B.Sc. (Lond.), 39, Handsworth Avenue, Hale End,
 Chingford.
 McDonald, Donald, B.Sc. (Lond.), 95, Clarence Gate Gardens, Regent's Park,
 London, N.W.
 McRae, John Alexander, M.A. (Queen's, Ontario), 184, University Avenue,
 Kingston, Ontario, Canada.
 Moss, Henry Webster, A.R.C.S.I., c/o Messrs. Read, Holliday & Co., Ltd.,
 British Dyes, Ltd., Huddersfield, Yorks.
 Nind, Edmund Robert, Pound House, near Hallow, Worcester.
 Truelove, Rupert Harry, B.Sc., A.R.C.S. (Lond.), 65, Hampton Road,
 Forest Gate, London, E.

New Associates.

- Bennett, George Macdonald, B.A., B.Sc. (Lond.), St. John's College, Cam-
 bridge.
 Boyd, Alexander John, 64, Newbattle Terrace, Edinburgh.
 Bracewell, Geoffrey Alfred, 17, Farcliffe Terrace, Bradford.
 Cheng, Pinzen, B.Sc. (Birm.), Kia-ting-hsien, near Shanghai, China.

Denington, Richard Charles, 69, Dover Road, South Wanstead, Essex.
 Emsley, Sydney, B.Sc. (Vict.), 17, Carlton Crescent, Southampton.
 Hepworth, Harry, B.Sc. (Lond.), University College, Nottingham.
 Hopper, Isaac, A.R.C.S.I., Drumshambo, Cookstown, co. Tyrone.
 Hutchison, George Lewis, B.Sc. (Lond.), c/o Mrs. Medhurst, 15, Wickham Lane, Plumstead, S.E.
 Jones, Alfred Owen, 48, Seymour Road, Bishopston, Bristol.
 Lumsden, Colin Henry, B.Sc. (Lond.), Homelea, Sandcliffe Road, Erith, Kent.
 Manley, Cyril Hubert, B.A. (Oxon.), 292, Iffley Road, Oxford.
 Porter, James Walker, A.R.C.S.I., 35, Templemore Avenue, Belfast.
 Roberts, Caryl Cameron, M.A. (Cantab.), 12, Marten Road, Folkestone.
 Taylor, Edgar Reuben, A.R.S.M., 63, King Street, Dudley.
 Tucker, Stanley Horwood, B.Sc., A.R.C.S. (Lond.), 68, Charlwood Road, Putney, London, S.W.

New Students.

Crawford, Archibald Barclay, Locher, Bridge of Weir.
 Crews, Sydney Kirby, 11, Woodbury Park Road, Ealing, London, W.
 Hickinbottom, Wilfred John, 46, Frederick Road, Stechford, Birmingham.
 Nicholls, Noel Albert, 165, Rotton Park Road, Edgbaston, Birmingham.
 Phillips, Reginald John, 8, Milford Road, Harborne, Birmingham.
 Smith, Douglas Gordon, Hueclecote Lodge, Hueclecote, near Gloucester.
 Somer, Arthur Joseph, 12, Cartwright Gardens, London, W.C.

DEATHS.

Fellows.

Lewes, Vivian Byam.
 Lyon, John George.
 Meldola, Raphael, D.Sc., LL.D., F.R.S., Past President.

Associate.

Allan, John Love Strathearn. (Killed in action.)

Student.

Smith, George Evanston. (Killed in action.)

FELLOWS, ASSOCIATES, STUDENTS AND CANDIDATES FOR EXAMINATION SERVING WITH THE COLOURS.

(SUPPLEMENTARY LIST.)

*It is requested that any inaccuracy or omission be reported
immediately to the Registrar.*

FELLOWS.

- Bean, C. E., Captain R.A.M.C. (T.F.), 4th Southern General Hospital.
 Brooke, J. R., Singapore Veterans' Corps.
 Brown, J. A., 1st Birmingham Battalion.
 Carter, A. C., Lieut. 2/6th Battalion The Welsh Regiment.
 Charles, R. P., Lieut.-Colonel Commanding 3 2nd Battalion London Regiment (Royal Fusiliers).
 Collett, R. L., 2nd Lieut. 23rd Battalion Middlesex Regiment.
 Duncan, C. C., Sergeant R.E.
 Finnemore, H., Inns of Court O.T.C.
 Garrett-Smith, Noel, 2nd Lieut. 2/8th Battalion Lancashire Fusiliers.
 Golding, J., Lieut. 35th Sanitary Section, R.A.M.C. (T.F.).
 Goldsbrough, H. A., Corporal R.E.
 Haddon, J. W., Singapore Volunteer Rifles.
 Harrison, E. F., Corporal R.E.
 Knight, H. F., Sub-section Comm. Motor Squadron, 1st Battalion Central London Rifles (United Arts Rifles).
 Ladell, W. R. S., Malay States Volunteer Rifles.
 Leather, J. Walter, Major 3rd Garrison Battalion, Cheshire Regiment.
 Le Sueur, H. R., Major R.E.
 McCombie, H., Lieut. 3/7th Battalion Worcestershire Regiment.
 Moor, C. G., Captain, O.C. 1st London Sanitary Section, British Expeditionary Force.
 Norman, G. M., Corporal R.E.
 Okell, F. L., Singapore Maxim Company.
 Page, R. P., 2nd Lieut. 2/6th Hants. Regiment (T.F.).
 Priest, M., Lieut. 1st London (City of London) Sanitary Company.
 Race, Joseph, Captain Canadian Army Hydrological Corps and Adviser on Sanitation.
 Read, W. J., R.A.M.C.

Ross, R., Major 2/3rd Battalion East Lancashire Regiment.
 Ryffel, J. H., Lieut. University of London O.T.C., Medical Section.
 Sawbridge, B. F., 2nd Lieut. 3rd London Rifle Brigade, 5th Battalion City
 of London Regiment.
 Shelton, J., Singapore Volunteer Rifles.
 Smith, F., Major-General, C.B., C.M.G., Army Veterinary Service.
 Stanley, Harry, Lieut. 2/4th Battalion Gloucestershire Regiment.
 Stone, O. J., R.F.A.
 Symons, W. H., R.A.M.C. (T.F.).
 Thompson, J., O.T.C.
 Wade, F., Sergeant Hants Royal Engineers (Electric Light Companies).
 Willcox, W. H., Lieut.-Colonel R.A.M.C. (T.F.).

ASSOCIATES.

Bate, S. C., St. Andrews University O.T.C.
 Clark, W. S., Corporal R.E.
 Crawford, J., 14th Battalion Argyll and Sutherland Highlanders.
 Dawson, D. S., 2/1st Battalion City of Aberdeen R.F.A.
 Eastburn, G. J., Driver A.S.C.-M.T., attached M.M.-G.S.
 Fielding, J. F. P., Squadron Sergeant-Major 2/1st County of London
 Yeomanry.
 Frazer, D. R., 2nd Lieut. 13th (Service) Battalion Worcestershire Regiment.
 Gilmour, H., 2nd Lieut. 8th Battalion South Lancashire Regiment.
 Honneyman, W., Corporal R.E.
 Harding, Gilbert, Corporal, R.E.
 Lambourne, H., 2nd Lieut. 14th Battalion Sherwood Foresters.
 Norris, W. H. H., 2nd Lieut. R.E.
 Norton, H. R., Corporal R.E.
 Raper, H. S., Captain R.A.M.C. (T.F.), 2nd Northern General Hospital.
 Robertson, Stewart, 3rd (Res.) Battalion Royal Inniskilling Fusiliers.
 Roos, C. B., Corporal R.E.
 Shepherd, E. H., Corporal R.E.
 Wheatley, R., Corporal R.E.
 Wilson, Arthur, 2nd Lieut. 4th Battalion Leinster Regiment.
 Wright, Thomas, 2nd Lieut. 2nd Battalion Royal Berkshire Regiment
 (killed in action).

STUDENTS.

Abelson, P., 1/2nd Sanitary Section, R.A.M.C.
 Bagshaw, W. N., 2nd Lieut. 2/4th Battalion York and Lancaster Regiment.
 Beesley, R. M., 28th County of London Regiment (Artists Rifles), British
 Expeditionary Force.
 Berridge, J. D., 2nd Lieut. 10th Battalion South Lancashire Regiment.
 Chalmers, F. G. D., Corporal R.E.

- Chitty, E. C., Corporal R.E.
 Clarke, F. G., R.A.M.C., 2/2nd Casualty Clearing Station.
 Collen, F. D., 2nd Lieut. 4th Battalion Notts. and Derby. Regiment.
 Cooper, H. E., Lieut. 15th Battalion Royal Warwickshire Regiment.
 British Expeditionary Force.
 Cowlishaw, G. D., 12th (S.) Battalion York and Lancaster Regiment.
 Gosney, H. W., 28th Battalion London Regiment (Artists Rifles).
 Hand, P. G. T., Corporal R.E.
 Haselhurst, H. W., Captain 9th Battalion Northumberland Fusiliers.
 Haythornthwaite, A., 2nd Lieut. R.F.A.
 Himus, G. W., Corporal R.E.
 Hislop, S. L., Corporal R.E.
 Hunwicke, R. F., Chief Petty Officer R.N.A.S., Mobile Anti-Aircraft Section.
 Jones, G. J., 2nd Lieut. 9th Battalion South Wales Borderers (attached 3rd).
 Lea, H. T., Corporal R.E.
 Lever, D., Corporal R.E.
 MacCulloch, A. F., Lieut. City of Edinburgh Battery, 1st Lowland Brigade
 R.F.A.
 Morrison, Norman, 2nd Lieut. 15th Battalion King's Liverpool Regiment.
 Murray, K. F. M., Lieut. 1st Battalion North Staffordshire Regiment,
 British Expeditionary Force.
 Norman, D. J., Corporal R.E.
 Pollard, H. E., Friends' Ambulance Unit.
 Potter, J. H., Corporal R.E.
 Richards, E. M., Corporal R.E.
 Roberts, E. J., Cadet, University of Wales O.T.C.
 Robinson, A. A., 2nd Lieut. R.G.A.
 Sadler, F., 9th Battalion Durham Light Infantry.
 Snow, W. A., Corporal R.E.
 Steele, A. R., 2nd Lieut. 12th (Res.) Battalion Scottish Rifles.
 Sugden, J. N., Lieut. (General List).
 Taylor, C. B., 47th (London) Division, 3rd London Field Company, R.E.,
 British Expeditionary Force.
 Thomson, M. S., Cambridge University O.T.C., Field Ambulance Section.
 Tye, A. G., 3rd Battalion Hon. Artillery Company.
 Ward, E. C., 2nd Lieut. A.S.C., Mechanical Transport, British Expeditionary
 Force.
 Watt, J. J., 3/28th Battalion London Regiment (Artists Rifles).
 Whitworth, A. B., Corporal R.E.
 Williamson, C. G., 2nd Lieut. 13th (Res.) Battalion Royal Warwickshire
 Regiment.

CANDIDATES FOR EXAMINATION.

- Levy, J. F., 10th Battalion Royal Fusiliers (City of London Regiment).
 Watson, J., Staff-Sergeant, 20th Sanitary Section.

Since the publication of the list given in Proceedings, Part II., entries have been altered in the following cases :—

FELLOWS.

Bacon, G. N., 2nd Lieut. Cornwall Royal Garrison Artillery (Territorial).
 Caw, W., Corporal R.E.
 Clement, L., Corporal R.E.
 Elliott, Stanley, temp. Major 4th Battalion (London Regiment) Royal Fusiliers.
 Eynon, Lewis, Corporal R.E.
 Ferrey, C. E. C., Lieut. 1st London Sanitary Co. R.A.M.C. (T.).
 Henville, Douglas, Lieut. 2/8th Battalion Hants. Regiment.
 Hill, J. R., Corporal R.E.
 Joy, A. S., Corporal R.E.
 Law, D. J., Corporal R.E.
 Murphy, P., 2nd Lieut. 23rd Battalion Middlesex Regiment.

ASSOCIATES.

Cheke, T. W., Corporal R.E.
 Chown, C. R., 2nd Lieut. R.F.A.
 Christie, J. H., Corporal R.E.
 Collins, C. G., Corporal R.E.
 Doidge, R. M., Sergeant R.E.
 Hay, J. G., Corporal R.E.
 Kent-Jones, D. W., Corporal R.E.
 Miller, J. B., Captain City of Aberdeen Fortress Royal Engineers.
 Rayner, E. A., Corporal R.E.
 Vernon, H., Corporal R.E.

STUDENTS.

Fagshaw, W. N., 2nd Lieut. 2/4th Battalion York and Lancaster Regiment (T.F.).
 Barry, W. R., Lieut. R.N. Division.
 Buttrick, H. P., Corporal R.E.
 Carlisle, W. F., Corporal R.E.
 Clarke, L. H., Corporal R.E.
 Cottrall, L. G., Corporal R.E.
 Doidge, H. F., Captain A.S.C. (Analytical Chemist)
 Dunsmore, A., Corporal R.E.
 Figg, E. F., Corporal R.E.
 Garland, T., Corporal R.E.
 Geake, A., Corporal R.E.
 Greaves, R., Corporal R.E.

Hatfield, C. G. M., Lieut. 18th Battalion Middlesex Regiment (Piercers)
 Hornby, A. J. W., 2nd Lieut. 14th Division R.F.A., British Expeditionary
 Force.

Islip, H. T., Corporal R.E.

Kind, R. G., Corporal W.B.M.B.F.A. (Cheshire R.A.M.C.).

Linzell, L., Corporal Army Veterinary Corps, 2nd London Division.

McDougall, D., Corporal R.E.

Merheim, G. A., Corporal R.E.

Moore, G. W., Corporal R.E.

Newitt, L. D., Lieut. Royal Artillery.

Rudolf, M. E. S., Corporal R.E.

Stephens, H. C., Corporal R.E.

Whitham, R. P. M., 2nd Lieut. 15th Battalion Northumberland Fusiliers.

Wilson, D. M., 2nd Lieut. 16th Royal Fusiliers, attached 2 8th Battalion
 London Regiment

CANDIDATES FOR EXAMINATION.

McConnan, J., 2nd Lieut. 14th Battalion Manchester Regiment.

Quibell, A. H., Captain 2/8th Battalion Sherwood Foresters.

Rait, P. W., Corporal R.E.

Thin, R. G., 2nd Lieut. 4th Battalion King's Own Scottish Borderers (T.F.)

General Notices.

Intermediate and Final Examinations.—The next Intermediate Examination and Final Examinations in (*a*) Mineral Chemistry, (*b*) Metallurgical Chemistry, (*c*) Physical Chemistry, (*d*) Organic Chemistry, and (*e*) The Chemistry of Food and Drugs, etc., will commence on January 3rd, 1916. Due notice of the exact dates will be sent to each Candidate.

The Council give notice that Examinations will not be held after January, 1916, until further notice.

Notice to Associates.— Associates elected prior to November, 1912, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry, for at least three years since their election to the Associateship, can obtain forms of application for election to the Fellowship.

Appointments Register.— A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in securing appointments for qualified chemists.

PRESENT POSITION OF THE BUILDING FUND.

A sum of approximately £1,500 is now required to settle all accounts in respect of the building and equipment.

	£	s.	d.	£	s.	d.
Estimated Total required ...				19,880	0	0
Total received or promised to date. (<i>Actually</i> received: £16,148 13s. 6d.)	16,771	6	1			
Interest and Dividends, <i>less</i> Interest on Loan from Bank and Depreciation on Investments	872	19	0			
Legacy under the Will of the late Edward Riley	1,000	0	0			
	<u>18,644</u>	5	1			
<i>Less</i> Incidental Expenses to date	265	4	0			
				<u>18,379</u>	0	7
				<u>£1,500</u>	19	5

30, RUSSELL SQUARE,
LONDON, W.C.
December, 1915.

THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED, 1877.
INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,
1916.

PART I.

REPORT OF THE COUNCIL, for the Year ending 1st March, 1916.
FINANCIAL STATEMENTS FOR 1915. BUILDINGS FUND.
ROLL OF HONOUR.
PROCEEDINGS OF THE COUNCIL.
ABSTRACTS OF THE REPORT OF THE BOARD OF EXAMINERS:
Intermediate and Final Examinations : January, 1916.
THE REGISTER.
NOTICES : Appointments Register : &c.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary

30, RUSSELL SQUARE, LONDON, W.C.,
February, 1916.

Proceedings Committee, 1915-16.

E. W. VOELCKER (*Chairman*),

SIR JAMES J. DOBBIE (*President*).

LEONARD ARCHBUTT,

H. BALLANTYNE,

EDWARD J. BEVAN,

GEORGE EMBREY,

M. O. FORSTER,

H. R. LE SUEUR,

W. H. ROBERTS,

F. W. STODDART,

W. L. SUTTON.

REPORT OF THE COUNCIL

(1915—1916).

To be submitted to the Fellows and Associates of the Institute at the Thirty-Eighth Annual General Meeting, to be held on Wednesday, March 1st, 1916.

I. THE ROLL OF THE INSTITUTE.

Since the publication of the Report for 1914—1915, the Council have elected 30 Fellows (of whom 27 were Associates). 33 Associates have been elected (of whom 17 were Registered Students). 45 new Students have been admitted.

The Council record with regret the death of 21 Fellows, 4 Associates and 6 Registered Students:—James Watson Agnew, John Jacob Beringer, A.R.S.M., Eustace Carey, Russell Forbes Carpenter, Charles Benjamin Caswell, Sir Arthur Herbert Church, K.C.V.O., M.A., D.Sc., F.R.S., Martin Dechan, Vivian Byam Lewes, David Alexander Louis, A.R.S.M., John George Lyon, Robert Fleming Macfarlane, Raphael Meldola, D.Sc., LL.D., F.R.S., Past President, Thomas Law Patterson, Frederick Ernest Pollard, Sidney George Rawson, D.Sc., Edward Cox Seaton, M.D., William James Sell, M.A., Sc.D., F.R.S., George Smith, Herbert Spargo, Robert Williamson, and Alfred Wolf, M.A., Ph.D., Fellows; John Love Strathearn Allan, Joseph Walter Harris, B.Sc., Harold Vernon, B.Sc., and Thomas Wright, B.Sc., Associates; and Ralph Smith Milliken, Thomas McIlveen Paterson, Kenneth Ross, B.Sc., George Evanston Smith, John Frew Smith, and Leslie Phillipps Smith, Students.

Of the above Messrs. Agnew, Allan, Harris, Vernon, Wright, Paterson, Ross, and G. E. Smith, died on active service.

The resignations of 6 Fellows and 6 Students have been accepted.

At the date of this Report (January 28th, 1916) the Register contains the names of 1,233 Fellows and 255 Associates—an increase during the year of 5 Members. The number of Registered Students is 379, an increase of 16.

2. THE WORK OF THE COUNCIL.

The Council have held 12 meetings, and there have been, in addition, 59 meetings of Committees, Boards and Sub-Committees.

Special Meetings of the Council and of the Glass Research Committee were held in November to meet Sir William M'Cormick, Chairman of the Advisory Council on Scientific and Industrial Research. (See p. 8.)

The following is a list of Committees and their respective Chairmen :—

COMMITTEE.				CHAIRMAN.
Finance	...	...	...	The Hon. Treasurer.
House	...	...	...	Edward John Bevan, <i>V.-P.</i>
Institutions	...	...	...	Martin Onslow Forster, <i>V.-P.</i>
Library	...	...	...	The Hon. Treasurer.
Nominations and Examinations	...	...	...	The President.
Proceedings...	...	...	...	Edward William Voelcker, <i>V.-P.</i>
Public Appointments	...	...	...	The President. <i>Deputy:</i> David Howard.

Special Committees.—Special Committees were appointed in connection with the equipment of the building and for glass research. A Special Joint Committee was appointed with members of the Society of Public Analysts, to deal with the supply of laboratory reagents. A Special Joint Committee with representatives of the Chemical Society, was appointed to deal with matters relating to glass manufacture, hygiene and public health.

3. FINANCE.

The Financial Statements for 1915 show that the receipts for the General Account of the Institute were slightly higher than for 1914, but owing to a number of unusual items it was not possible to keep the expenditure within the receipts.

The statements submitted at the Annual General Meeting

on March 1st, 1915, showed that with the proceeds of the Redemption Policies on the lease and laboratories at 30, Bloomsbury Square, the Council had purchased for General Account the investments of the Building Fund to the amount of £3,555. The remaining investments of the Building Fund, consisting of £1,398 Midland 2½ per cent. Preference Stock, have also been acquired during the year at a cost of £825 19s. 10d. for the General Account.

When the Government issued the 4½ per cent. War Loan and provided for the conversion of 2½ per cent. Consols, the Council decided, owing to the depreciation in Trustee Stocks, not to realise any of the Institute's investments on General Account, but to obtain a loan from the bank for the purchase of sufficient War Loan Stock to enable them to convert the Institute's holding of £2,000 2½ per cent. Consols, and also to meet current expenditure and the outstanding building accounts as they became due.

The Loan of £4,700 was devoted to the following purposes :—

	£	s.	d.
Purchase of £2,800 War Loan for the conversion of the Institute's holding in Consols	2,789	2	7
Purchase of £1,398 Midland Stock from Building Fund	825	19	10
Loan to Building Fund	982	10	2
To General Account	102	7	5
	<hr/>		
	£4,700	0	0

The extraordinary expenditure for the year amounted to £415 17s. 10d., as follows :—

	£	s.	d.
Repayment to Building Fund of deposit on the site	300	0	0
Removal Expenses	25	0	0
Glass Research	45	10	6
Interest on Loan	45	7	4
	<hr/>		
	£415	17	10

There were also items of expenditure on furnishing and apparatus which will not ordinarily recur, and at the close of the year there remained to be paid £75 for rent due at Christmas, and £68 10s. 10d. in respect of rates.

When the final accounts on the building become due, it will be necessary for the Finance Committee to draw for the time being on the General Fund, and they will wait for a favourable opportunity for realising investments for this purpose and for paying off the loan.

The Council have pleasure in reporting that a sum of £500 will eventually accrue to the General Funds under the will of the late Professor Meldola.

Building Fund.—The Accounts for the Building Fund indicate that the receipts for the year 1915 amounted to £781 4s. The total outstanding liabilities are estimated at £2,682 10s. 2d., to meet which, in addition to a legacy of £1,000 under the will of the late Mr. Edward Riley, there is a sum of £350 in contributions promised and £19 8s. further contributions already received this year. The amount yet to be raised is, therefore, about £1,240.

4. PROFESSIONAL CHEMISTRY AND THE WAR.

A list of Fellows, Associates, Registered Students and Candidates for examination who are serving or have served with the forces is published with this Report.

The Institute has continued to render service to the Government in many matters connected with the war, and has been in direct touch with departments requiring information and scientific assistance. The inquiries dealt with related to such subjects as army chemical supplies, laboratory apparatus, inventions, materials of war, trading with the enemy, and questions of contraband.

The demand for men with training in chemistry, required for naval and military service, and for the manufacture of munitions and of other materials of war, was so great that the Council determined, early in 1915, to establish a register of chemists, whether or not already connected with

the Institute, available for various branches of work. This register has been freely utilised by the authorities, and a large number of chemists have been appointed through this means.

In view of Lord Derby's scheme for recruitment and the urgent necessity of maintaining an adequate number of chemists in the country, the Government has recently decided that they should not be accepted for immediate enlistment or called up for service with the Colours except with the sanction of the Royal Society. Fellows, Associates, and Registered Students have been notified by a circular issued on December 31st, 1915, that at the request of the Government the Royal Society have appointed a Special Committee to deal with questions arising in this connection.

Mention has been made in the Proceedings of the appointment by the Admiralty of an Inventions Board to assist in co-ordinating and encouraging scientific effort in connection with the requirements of the Naval Service, and the appointment by the Ministry of Munitions of an Advisory Panel of scientific and other experts to consider suggestions with regard to the manufacture of materials of war. The Institute has in several instances been the means of bringing inventors into touch with these and other authorities dealing with such questions.

The attention of Fellows and Associates has been directed to the desirability of submitting to the departments concerned ideas and inventions for appliances connected with the prosecution of the war.

5. BRITISH CHEMICAL INDUSTRIES.

The Council have reported in Proceedings, Part III., 1915, the action taken by the Royal Society with the co-operation of the Chemical Society, the Society of Chemical Industry, the Society of Public Analysts and the Institute of Chemistry, to direct the attention of the Government to the importance of developing British chemical industries. The representations of these bodies resulted in a grant being made by Parliament in aid of scientific and industrial research, and in

the appointment of a Committee of the Privy Council and an Advisory Council for the organisation and development of a scheme for the administration of the grant.

6. THE GLASS RESEARCH COMMITTEE.

The Council have pleasure in recording their grateful thanks to the Members of the Glass Research Committee for their services. Under the Chairmanship of the late Professor Meldola, the work of the Committee has been successfully pursued and the results obtained have assisted British manufacturers to produce satisfactory laboratory ware and tubing hitherto almost exclusively obtained from abroad. Formulas have also been published for the manufacture of resistance glass for pharmaceutical purposes, glass for miners' lamps, for X-ray bulbs, and other glass rendered necessary through the stoppage of supplies from enemy countries. Thus, the work of the Committee has not only benefited the profession, but has been of great value in connection with the production of armaments and munitions, in coal-mining, and in the provision of apparatus required by the medical service in the field. The success of this work is mainly due to Professor Herbert Jackson and Mr. Thomas R. Merton, of King's College, London. The Committee also acknowledge the special assistance in analytical work of Mr. Gilbert Alderton, working under the direction of Mr. Bertram Blount.

Dr. George Beilby, Past-President, has been appointed as the new Chairman of the Committee, and Professor Herbert Jackson has been appointed Vice-Chairman.

In connection with the work of the Glass Research Committee, an application was addressed to the Government Advisory Council for a grant in aid of further research on glass for laboratory apparatus and other purposes. The Advisory Council were also informed that the Committee were prepared to investigate certain forms of optical glass. The Council of the Institute have received grants for both investigations. As it is considered desirable to reserve the publication of the formulas to British manufacturers, they will be

communicated only on conditions to be agreed upon between the manufacturers, the Board of Trade, and the Institute.

The names of firms who have undertaken the manufacture of laboratory glassware have already been mentioned in the Proceedings.

7. LABORATORY REAGENTS AND APPARATUS.

A report on the work of the Special Joint Committee appointed by the Councils of the Institute and the Society of Public Analysts to consider the steps to be taken to ensure a satisfactory supply of laboratory reagents was published in February, 1915, when a pamphlet was issued containing a list of reagents for analytical purposes with notes indicating the standards of purity necessary for analytical work. There has been little difficulty, if any, experienced in obtaining supplies of the substances scheduled in the list.

Attention has also been directed to the satisfactory production by British firms of laboratory porcelain and filter paper.

The Council repeat their acknowledgment of the ready help afforded in these matters by those manufacturers who have endeavoured to meet the requirements of the profession and they desire to urge all users to support the efforts which are being made to render the country independent of such supplies from abroad.

8. THE CHEMICAL SOCIETY AND THE SOCIETY OF CHEMICAL INDUSTRY.

On the invitation of the Chemical Society the Council of the Institute appointed members of a Joint Committee, which has dealt with various questions referred to the Society on the subjects of glass manufacture, hygiene and public health.

The Council have expressed their willingness to co-operate with the Society of Chemical Industry in steps proposed to be taken by the latter Society to promote the interests of British chemical industries, by the compilation of a register of manu-

facturers of chemical products and makers of plant. The Council of the Institute suggested that the publication should be restricted to actual manufacturers and producers, to the exclusion of mere agents.

9. HOUSE COMMITTEE.

Although the Annual General Meeting was held in the new premises, and the effects of the Institute were moved in March, 1915, the new building was not fully in occupation until the end of October.

The House Committee limited the expense of furnishing to the provision of essential requirements, using as far as possible the furniture and material moved from Bloomsbury Square.

In consequence of the high assessment placed on the building, Mr. Edward Bevan, Chairman of the Committee, with Mr. H. D. Buckland, Surveyor, and the Registrar, appeared before the Assessment Committee of the Holborn Board of Guardians and obtained a moderate reduction on the proposed rateable values.

10. INSTITUTIONS COMMITTEE.

On a report from a joint meeting of the Nominations and Examinations Committee and the Institutions Committee, the Council have decided to place the Municipal Technical School, Birmingham, on the List of Institutions recognised for the training of candidates for the Associateship of the Institute, subject to the usual conditions, and have under consideration the cases of several other Institutions in London and in the provinces with a view to their addition to the list.

11. EXAMINATIONS.

The Board of Examiners for the past year consisted of :—

The President, *Chairman*.

For the Intermediate Examination and in General Chemistry :

Arthur William Crossley, D.Sc., Ph.D., F.R.S., F.I.C.

Harold Govett Colman, Ph.D., M.Sc., F.I.C.

For the Examination :

- (a) Mineral Chemistry ... George Nevill Huntly, B.Sc., A.R.C.S., F.I.C.
- (b) Metallurgical Chemistry Cecil Henry Desch, Ph.D., D.Sc., F.I.C.
- (c) Physical Chemistry ... Frederick George Donnan, M.A., Ph.D., F.R.S., F.I.C.
- (d) Organic Chemistry ... William Jackson Pope, M.A., F.R.S., F.I.C.
- (e) The Chemistry of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water. Bernard Dyer, D.Sc., F.I.C.
- Therapeutics, Pharmacology and Microscopy. Frederick Gowland Hopkins, D.Sc., M.B., M.A., F.R.S., F.I.C.
- (f) Biological Chemistry, Bacteriology, Fermentation and Enzyme Action. Alfred Chaston Chapman, F.I.C.

Dr. Arthur Harden was co-opted as Examiner in General Chemistry for the Examinations held in July, 1915, and January, 1916, in consequence of Lieut.-Col. Crossley and Dr. Colman being engaged on Government service.

The places and dates of the Examinations were as follows :—

Intermediate Examination :—At the Institute, April and July, 1915, and January, 1916 ; and at the Royal Technical College, Glasgow, July, 1915.

Final Examination :—

Mineral Chemistry :—At the Institute, July, 1915, and January, 1916.

Metallurgical Chemistry :—At the Royal Technical College, Glasgow, July, 1915.

Physical Chemistry :—At the Institute and at University College, London, April, 1915.

Organic Chemistry :—At the Institute, April and July, 1915, and January, 1916 ; at the Royal Technical College, Glasgow, July, 1915 ; and at the Royal College of Science for Ireland, June—July, 1915.

Chemistry of Food and Drugs, etc. :—At the Institute, April and July, 1915, and January, 1916.

Biological Chemistry :—At the Institute and at the laboratory of Mr. A. Chaston Chapman, October, 1915.

The Examinations at Glasgow were held under the supervision of Professor G. G. Henderson, Dr. Cecil H. Desch, and Professor Alfred Campion ; that at Dublin, under the supervision of Professor Gilbert T. Morgan, and Professor Sydney

Young. The following have assisted the Board during the year :—Mr. L. E. Hinkel at the Examinations held in London ; Miss M. M. J. Sutherland, D.Sc., at the Examinations at Glasgow, and Mr. H. W. Moss at the Examination at Dublin. Mr. John Webster assisted at the Examinations in Therapeutics, Pharmacology and Microscopy.

The thanks of the Council, for the use of laboratories, have been accorded to the Governors of the Royal Technical College, Glasgow, to the Department of Agriculture and Technical Instruction for Ireland, University College, London, and to Mr. A. Chaston Chapman.

The results are summarised in the following table :—

				EXAMINED.		PASSED.	
Intermediate Examination	...	...	...	...	20	...	12
Final (A.I.C.) Examination :—							
Branch (a) Mineral Chemistry	...	...	...	...	3	...	2
Branch (b) Metallurgical Chemistry	...	...	...	...	1	...	0
Branch (c) Physical Chemistry	...	...	...	...	1	...	1
Branch (d) Organic Chemistry	...	...	...	...	21	...	15
Branch (e) Chemistry of Food and Drugs, etc.	...	...	...	...	16	...	14
Branch (f) Biological Chemistry	...	...	...	...	1	...	0
General Chemistry	...	...	...	...	1	...	1
				<hr/>		<hr/>	
				64		45	
				<hr/>		<hr/>	

The Council have intimated that after January, 1916, Examinations will be suspended until further notice ; but in view of the fact that a number of candidates have signified their wish to present themselves in July next, the question will be reconsidered in March. All candidates who are desirous of presenting themselves in July are, therefore, requested to communicate with the Registrar.

12. LIBRARY.

The Council record their thanks to all who presented volumes and pamphlets during the year. The list of additions to the Library and the list of journals received will be published in Proceedings, Part II.

The collection has been arranged in the new Library by Mr. F. W. Clifford, Librarian of the Chemical Society.

The amount at the disposal of the Library Committee during the year, after deducting the deficit on the account at the close of 1914, was £17 8s. 0d. The sum expended in subscriptions to journals, purchase of books and binding, and the arrangement of the collection in the new premises amounted to £21 7s. 9d., and the account at the close of the year showed a deficit, therefore, of £3 19s. 9d.

13. REGULATIONS.

The Regulations for the admission of Fellows, Associates and Students were reprinted in August, 1915, with alterations which have been notified by the Council from time to time since the issue of the previous edition.

The further consideration of the proposed new Regulations, referred to in the last Annual Report, is postponed until after the war.

14. PUBLIC APPOINTMENTS COMMITTEE.

The Council have received reports from the Public Appointments Committee on questions raised in connection with Fisheries Notice No. 5, issued by the Board of Agriculture and Fisheries in December, 1914, and on matters of professional interest which have arisen in Ireland and in Australia.

The action taken by the Council with regard to Fisheries Notice No. 5 was fully reported in Proceedings, Part III., 1915.

At a meeting held in July, the attention of the Council was directed to a circular issued by the Local Government Board for Ireland to the local authorities concerned with the administration of the Sale of Food and Drugs Acts. The Board directed the attention of the local authorities to the fact that the samples submitted for analysis had been few in number and restricted to only a few classes of articles. They recommended that a larger number of samples of milk should be taken, and that inspectors should submit for analysis a more varied selection of foodstuffs and drugs.

It was represented to the Council that the effect of this

circular would be to impose a hardship on a number of public analysts who hold appointments at a fixed salary, irrespective of the number of samples submitted.

The Council, therefore, addressed a letter to the Board expressing their appreciation of the steps taken to promote the better administration of the Sale of Food and Drugs Acts in Ireland, but pointing out the effect of the circular on the interests of the analysts referred to.

The Council asked the Board to bring influence to bear on local authorities, with a view to securing a corresponding improvement in the emoluments of public analysts in respect of the increased services required of them.

The reply of the Board indicated that they did not anticipate that there would be any great increase in the total number of samples analysed or in the work which would devolve on the public analysts.

In the course of time, however, it became evident from figures supplied by public analysts in different parts of the country that the work had considerably increased. The Council, therefore, drew the attention of the Board to that fact and again requested that they should support the applications of the public analysts in question for more adequate remuneration of their services, either by increase of salary or by substituting for the salary, payment by fee per sample. The Council also forwarded copies of the statement, published in January, 1914, on "The Conditions of Appointments of Public Analysts," giving the views of the Council of the Institute and the Society of Public Analysts on this subject.

The attention of the Council was also called to the action taken by the Local Government Board for Ireland in connection with the appointment of Medicine Analysts for various Unions. In these cases, the Boards of Guardians had agreed to increase the remuneration of the analysts, and the Local Government Board had declined to sanction any increase which had the effect of bringing the fee up to more than 6s. per sample. The Council of the Institute informed the Board that, having regard to the requirements of the latest edition

of the British Pharmacopœia, they were of opinion that the fees paid for such work were inadequate.

The Board was asked to give very careful consideration to these matters in the interests of the proper administration of the Acts concerned, which the Council felt was seriously jeopardised when the remuneration of responsible officers was such as to render it practically impossible for them to perform their duties with the thoroughness and efficiency which should be demanded in work of the kind.

In reply the Council received a letter stating that the question of the remuneration of public analysts was a matter outside the sphere of the Board's functions; that the circular with regard to the Sale of Food and Drugs Acts had been issued not with the object of increasing the total number of samples, but of securing a systematic selection of samples of different varieties of foods and drugs. The Board felt it would be premature for a period of at least two years to determine whether the work of the public analysts was appreciably increased when judged by the figures of former years, and that the time was not opportune to approach public bodies for increased salaries.

In connection with the work of the medicine analysts, the Board observed that the increased salaries asked for from Guardians ranged as high as 50 per cent. of the total expenditure on drugs, and they were of opinion that a salary on that basis could not be defended as part of an economic system.

In November last, the attention of the Council was called to the answers given by the Minister of Trade and Customs for the Commonwealth of Australia in reply to questions addressed to him with regard to an appointment, notified in the *Commonwealth Gazette* of July 17th, 1915, of an official analyst for the purposes of the Customs Act, and the Council, having carefully considered the circumstances, addressed a letter on the matter to the Minister concerned.

| The Council took the opportunity to direct attention to a principle the recognition of which they regarded as of the highest importance in selecting candidates for scientific and

technical posts. It appeared to them that the possession of a degree or diploma granted by some competent authority was necessary as a guarantee to the public that the holders of such offices had received the training and reached the standard of efficiency in their profession requisite for the proper discharge of their duties. Such evidence of professional status was especially desirable where the duties of the post brought the officer into close relations with the holders of corresponding posts in other countries. The interests of the Government concerned required that the standing of their scientific officers should be attested by qualifications generally accepted as implying a high standard of professional attainment. [The Council felt that, unless the possession of such a qualification was insisted on, the efforts of those who were desirous of promoting the highest efficiency in branches of the public service, for which definite scientific education was essential, would be frustrated. The Council urged, therefore, that the department should, whenever possible, require, from candidates for professional appointments, evidence of systematic training such as a degree or diploma affords.

15. APPOINTMENTS REGISTER.

The Appointments Register has proved helpful to Fellows and Associates and also to Belgian and other ally refugee chemists and metallurgists.

16. HONORARY CORRESPONDING SECRETARIES.

The Council record their thanks to the Honorary Corresponding Secretaries for their services.

17. PUBLICATIONS, 1915—1916.

The Proceedings for 1915 were published in four parts: Part I., issued in February, contained the Report of the Council and Financial Statements for 1914, with abstracts of the report on the examinations held in January, 1915; Part II., issued in April, included the Report of the Annual General Meeting.

the retiring President's address and a preliminary report on the work of the Glass Research Committee ; Part III., issued in August, included an abstract of the report on the April Examinations and dealt mainly with the proceedings of the Council in various matters connected with the war, laboratory supplies, and the action taken with reference to Fisheries Notice No. 5 ; and Part IV., issued in December, contained an account of further matters connected with the war and abstracts of the reports on the July and October Examinations.

The List of Reagents for Analytical Purposes, referred to on page 9, was published in February, 1915.

The Examination Papers for 1915 were published in January, 1916.

30, RUSSELL SQUARE,
LONDON, W.C.,
28th January, 1916.

REPORT OF THE AUDITORS.

Having examined the Books and Vouchers, and verified the investments in $4\frac{1}{2}$ per cent. (Inscribed) War Loan Stock, in Metropolitan 3 per cent. Stock, and in New Zealand 4 per cent. Inscribed Stock, standing to the credit of the Institute in the Books of the Bank of England, and the investment in Victoria 4 per cent. Inscribed Stock, standing to the credit of the Institute in the Books of the London County and Westminster Bank, Limited; also having received a statement from the London County and Westminster Bank (Bloomsbury Branch) that the said Bank holds for the Institute Bonds and certificates for $4\frac{1}{2}$ per cent. War Loan Stock, Great Western Railway Debenture Stock, Midland Railway $2\frac{1}{2}$ per cent. Preference Stock, and Canada $3\frac{1}{2}$ per cent. Registered Stock, we certify that the following statements are correct.

PERCY E. SPIELMANN,	} <i>Hon.</i> <i>Auditors.</i> 1915-16.
HERBERT F. STEPHENSON,	
L. T. THORNE,*	

January 13th, 1916.

* Co-opted in the place of Lieut. E. F. Harrison.

INSTITUTE OF CHEMISTRY BUILDINGS FUND.

STATEMENT OF RECEIPTS AND EXPENDITURE SINCE THE OPENING OF BUILDINGS FUND A/c, 1909—1915.

RECEIPTS.			EXPENDITURE.		
	£	s. d.		£	s. d.
Contributions ... ..	...	...	Site and Building Costs to date:		
Dividends and Interest ... ..	...	...	Bedford Estate	798	3 9
Realisation of Investments ... ..	...	...	Contractors and Subcontractors	15,822	16 7
Repayment of Deposit on Lease from General A/c ... ..	...	...	Architect and Surveyor	825	0 0
Loan from General A/c ... ..	...	...	Electrical Engineer	26	5 0
			Legal Expenses	32	10 0
			Insurance	35	0 4
			Clerk of Works	401	6 7
			Miscellaneous Expenses (Printing, Postage, etc.)	273	1 3
				18,214	3 6
			Investments at cost, including Commission	4,806	11 0
			Interest on Loan from General A/c	61	8 8
			Balance at Bank, 31st Dec., 1915—		
			Current A/c	71	19 8
				£23,154	2 10
ASSETS.			LIABILITIES.		
	£	s. d.		£	s. d.
Balance at Bank 31st Dec., 1915—			Loan from General A/c ... ..	...	...
Current A/c	71	19 8	Outstanding accounts estimated at	982	10 2
Legacy from the late F. Riley, Esq., F.I.C.	1,000	0 0		£1,700	0 0
Outstanding Promises, about	550	0 0			

THE INSTITUTE OF CHEMISTRY

Founded, 1877.

STATEMENT OF RECEIPTS AND EXPENDITURE

		GENERAL					
1914.		RECEIPTS.			£	s.	d.
		Balance at Bank on the 31st					
£280 11 7		Dec., 1914				194	0 10
		Subscriptions—					
1,043 13 3		Fellows'			1,035	7	3
267 10 0		Associates'			253	1	0
81 15 0		Students'			81	0	0
						1,369	8 3
210 0 0		Entrance Fees				147	0 0
163 0 10		Dividends				345	18 8
28 16 1		Sale of Publications				10	14 2
0 6 7		Sundry Receipts				8	9 11
		Examinations and Laboratory					
645 9 0		Account				729	13 2
15 12 6		Appointments Register				11	4 0
2,756 14 10						2,816	9 0
		Life Compositions and Fees					
114 9 0		reserved for Investment : ...				74	11 0
		Special Edition of the History...				18	7 6
7 14 11		Buildings Fund : Postage (1914)				5	0 9
5,355 0 0		Redemption Policies' Proceeds					
		(1914)					
		Loan from Bank... ..				1,700	0 0
£6,613 18 9						£7,614	8 3

OF GREAT BRITAIN AND IRELAND.

Incorporated by Royal Charter, 1885.

FOR THE YEAR ENDED DECEMBER 31ST, 1915.

ACCOUNT.

1914.	EXPENDITURE.	£ s. d.
£500 8 9	Printing, Stationery, Office Books, &c. ...	243 3 10
190 7 1	Postage	119 0 8
115 1 0	Rent	122 18 4
107 4 0	Rates and Taxes... ..	200 4 2
12 19 0	Insurance... ..	56 0 9
25 18 6	Repairs and Furnishing	30 9 10
512 4 4	Salaries and Wages	901 6 4
85 19 2	Advertisements	51 9 5
51 7 5	Gas, Water and Electric Light and Power ...	91 14 0
18 11 6	Telephone	21 18 11
	Examiners and Assistants (Fees and	
598 8 10	Expenses)	504 11 6
105 12 9	Apparatus and Materials	86 3 5
8 8 5	Sundry Examination Expenses	6 2 7
32 11 3	Library Account (<i>see over</i>)	21 7 9
	Household, Fuel, etc.	84 2 3
31 19 2	Miscellaneous Expenses	29 11 8
26 10 9	Legal Expenses	18 7 0
117 14 0	Lectures (1914)	
2,845 5 11		2,588 12 5
	Removal Expenses	25 0 0
15 11 3	Glass Research Account	45 10 6
5 0 9	Loan to Buildings Fund	974 13 5
3,555 0 0	Postage, Buildings Fund (1915)	7 16 9
	Purchase of Investments from Buildings Fund	825 19 10
	Purchase of War Loan Stock	2,789 2 7
	Rent (in lieu of Deposit on Lease) repaid to	
	Buildings Fund	300 0 0
	Interest on Loan from Bank	45 7 4
194 0 19	Balance at Bank on the 31st Dec., 1915 ...	12 5 5
£6,613 18 9		£7,614 8 3

STATEMENT OF ASSETS AND

1914.	ASSETS.	£	s.	d.
£194 0 10	Balance at Bank...	12	5	5
228 14 7	Approximate Value of Furniture ...	405	15	7
275 6 1	Approximate Value of Apparatus and Materials ...	258	12	5
449 17 10	Approximate Value of Library...	415	17	9
	£4,133 6s. 8d. War Loan Stock, 31st Dec., 1915 ...	4,017	1	8
1,380 0 0	£2,000 2½ per cent. Consols (1914).			
3,000 0 0	£3,000 Victoria 4 per cent. Inscribed Stock, 31st Dec., 1915 ...	2,880	0	0
980 0 0	£1,000 New Zealand 4 per cent. Inscribed Stock, 31st Dec., 1915 ...	960	0	0
609 0 0	£700 Canada 3½ per cent. Registered Stock, 1930-1950, 31st Dec., 1915 ...	575	15	0
426 5 0	£500 Metropolitan 3 per cent. Stock, 31st Dec., 1915 ...	411	5	0
312 10 0	£500 Great Western Railway 2½ per cent. Debenture Stock, 31st Dec., 1915 ...	302	10	0
999 16 0	£1,833 Midland Railway 2½ per cent. Perpetual Preference Stock, 31st Dec., 1915 ...	981	11	2
	Loan to Buildings Fund ...	982	10	2

LIBRARY FUND ACCOUNT for

	RECEIPTS.	£	s.	d.
£25 0 0	Grant from General Account ...	25	0	0
7 12 0	Deficit: 31st Dec., 1915 ...	3	19	9
£32 12 0		£28	19	9

BUILDINGS FUND ACCOUNT for

	RECEIPTS.	£	s.	d.	£	s.	d.
	Balance at Bank, Dec. 31st, 1914:—						
£65 14 4	Current A/c ...	431	9	6			
4,800 0 0	Deposit A/c ...	5,250	0	0			
					5,681	9	6
3,669 3 10	Contributions ...				781	4	0
259 13 4	Interest and Dividends ...				39	1	1
3,555 0 0	Realisation of Investments ...				825	19	10
	Repayment of Deposit on Lease from General Account ...				300	0	0
	Loan from General Account ...				982	10	2
£12,349 11 6					£8,610	4	7

	ASSETS.	£	s.	d.
	Balance at Bank, 31st Dec., 1915:—			
£564 9 6	Current A/c ...	71	19	8
	Legacy from the late E. Riley, Esq., F.I.C. ...	1,000	0	0
	Outstanding promises, about ...	370	0	0

LIABILITIES, Dec. 31st, 1915.

1914.	LIABILITIES.	£ s. d.	£ s. d.
	Subscriptions received in advance—		
£18 18 0	Fellows'	22 1 0	
3 3 0	Associates'	5 5 0	
1 5 0	Students'	1 0 0	
			28 6 0
	Subscriptions to Special Edition of the History of the Institute		18 7 6
	Fees for the January (1916) Examination received in advance		89 5 0
141 15 0	Balance on Biological Examination A/c		14 4 10
14 4 10	Rent outstanding		75 0 0
	Rates outstanding		68 10 10
	Loan from Bankers		4,700 0 0

the Year ended Dec. 31st, 1915.

	EXPENDITURE.	£ s. d.	£ s. d.
£0 0 9	Deficit : 31st Dec., 1914 ...		7 12 0
27 6 3	Books, Journals, Binding, etc. ...	10 19 9	
5 5 0	Arrangement of Library	10 8 0	
			21 7 9

	LIABILITIES.	£ s. d.	£ s. d.
£32 12 0	Deficit	£3 19 9	£28 19 9

the Year ended Dec. 31st, 1915.

	EXPENDITURE.	£ s. d.	£ s. d.
	Building Costs :—		
	Contractors and Sub-Con-		
£5,984 15 4	tractors	7,931 16 7	
425 0 0	Architect	400 0 0	
224 18 0	Clerk of Works	131 1 1	
33 8 8	Miscellaneous Expenses	6 1 10	
			8,468 19 6
	Interest repaid to General Account		61 8 8
	Postage (1915) to General Account		7 16 9
	Balance at Bank, 31st Dec., 1915 :—		
5,681 9 6	Current A/c		71 19 8
£12,349 11 6			£8,610 4 7

	LIABILITIES.	£ s. d.	£ s. d.
£7 14 11	Loan from General A/c		982 10 2
	Outstanding Accounts, estimated at...		1,700 0 0

FELLOWS, ASSOCIATES, STUDENTS AND CANDIDATES FOR EXAMINATION WHO HAVE SERVED OR ARE SERVING WITH H.M. FORCES.

*It is requested that any inaccuracy or omission be reported
immediately to the Registrar.*

FELLOWS.

- Agnew, J. W., 2nd Lieut. 3rd Battalion Highland Light Infantry (killed in action).
 Alton, W. L. St. J., Corporal Hon. Artillery Company.
 Archbutt, S. L., Corporal 28th County of London Regiment (Artists Rifles).
 Auld, S. J. M., Lieut. 4th Battalion Royal Berkshire Regiment.
 Bacon, G. N., 2nd Lieut. Cornwall Royal Garrison Artillery (T.F.).
 Baker, M. S., Public Schools Battalion, Royal Naval Division.
 Barke, H. F., Bombardier Gloucester Royal Field Artillery (T.F.).
 Barrowcliff, M., Malay States Volunteer Rifles.
 Bassett, F. L., 2nd Lieut. Royal West Kent Regiment.
 Bean, C. E., Major R.A.M.C. (T.F.).
 Blair, R. W., 2nd Lieut. 10th Battalion East Lancashire Regiment.
 Bridge, S. W., Lance-Corporal 10th (Service) Battalion Royal Fusiliers.
 Brooke, J. R., Singapore Veterans' Corps.
 Brown, B. M., 2nd Lieut. Wessex Brigade, Royal Field Artillery.
 Brown, J. A., 1st Birmingham Battalion.
 Browne, Frank, Hongkong Volunteer Reserve.
 Bruce, Robert, 2nd Lieut. 16th Battalion Highland Light Infantry.
 Carter, A. C., Lieut. 2/6th Battalion The Welsh Regiment.
 Caw, W., Corporal R.E.
 Charles, R. P., Lieut.-Colonel Commanding 3 2nd Battalion London Regiment (Royal Fusiliers).
 Claremont, C. L. L., 2nd Lieut. (Reserve of Officers) 5th Battalion King's Royal Rifle Corps.
 Clement, L., Corporal R.E.
 Collett, R. L., Lieut. 23rd Battalion Middlesex Regiment.
 Cowap, J. C., Penang Volunteer Rifles.
 Crossley, A. W., Lieut.-Colonel (Staff).
 Duncan, C. C., Lieut. A.O.C.
 Eaton, B. J., Sergeant, Malay States Volunteer Rifles.
 Elliott, Stanley, Temp. Major 4th Battalion (London Regiment) Royal Fusiliers.

- Evans, B. S., 28th Battalion County of London Regiment (Artists Rifles).
 Evans, H. J., Lieut. 2nd Welsh Brigade, Royal Field Artillery.
 Eynon, Lewis, Corporal R.E.
 Ferrey, C. E. C., Lieut. 1st London Sanitary Company R.A.M.C. (T.F.).
 Fennemore, H., Inns of Court O.T.C.
 Foster, J. A., Captain 11th Battalion East Yorks Regiment.
 Franklin, A. C., Sergeant Hongkong Volunteer Reserve.
 Frye, C. C., Lieut. R.A.M.C.
 Gadd, W. L., Lieut.-Colonel Kent Royal Garrison Artillery (Service Corps).
 Garle, J. L., Lieut. R.N.V.R.
 Garrett-Smith, Noel, 2nd Lieut. 2 Sth Battalion Lancashire Fusiliers.
 Golding, J., Lieut. 35th Sanitary Section, R.A.M.C. (T.F.).
 Goldsbrough, H. A., Corporal R.E.
 Goodban, L., 2nd Lieut. 4 10th Battalion Middlesex Regiment.
 Goodwin, L. F., Major 2nd Battalion Canadian Expeditionary Force.
 Haddon, J. W., Singapore Volunteer Rifles.
 Hampshire, C. H., Hon. Artillery Company.
 Harrington, A. G., Singapore Volunteer Rifles.
 Harrison, E. F., Lieut. R.A.M.C.
 Heap, Harri, Cadet Manchester University O.T.C.
 Heilbron, I. M., Captain 1st Company A.S.C., 52nd Divisional Train, 10th
 Division, British Balkan Expeditionary Force.
 Henville, D., Lieut. 3/8th Battalion Hants. Regiment.
 Hill, J. R., Corporal R.E.
 Hills, J. S., Able-Bodied Seaman, Royal Naval Volunteer Reserve, Anti-
 Aircraft Corps.
 Hinks, Edward, Temp. Lieut. A.O.D.
 Hodgson, T. R., Captain East Lancs. Divisional Transport and Supply
 Column, A.S.C. (T.F.).
 Howard, B. F., Lieut. 28th (Reserve) Battalion County of London Regi-
 ment (Artists Rifles).
 Joy, A. S., Sergeant R.E.
 Kirkham, V. H., Captain East African Medical Service (Analyst to the
 Forces).
 Knight, L., 2nd Lieut. Royal Field Artillery.
 Krall, Hans, Trooper United Provinces Horse (India).
 Ladell, W. R. S., Malay States Volunteer Rifles.
 Law, D. J., Corporal R.E.
 Law, Robert, Major, C.O. 4th Australian Engineers.
 Leather, J. W., Major 3rd Garrison Battalion Cheshire Regiment.
 Le Sueur, H. R., Major R.E.
 Liversedge, S. G., Corporal R.E.
 Lucas, E. W., Able-Bodied Seaman, R.N.V.R., Anti-Aircraft Corps.
 Luff, A. P., Major R.A.M.C. (T.F.).
 Marriott, T. B., Lieut. R.E.

- McCombie, H., Lieut. 3 7th Battalion Worcestershire Regiment.
 McDonald, D., Lieut. 11th (Service) Battalion Middlesex Regiment.
 Mercer, Thomas, Lieut. 10th (Service) Battalion Hants. Regiment.
 Merrett, W. H., Major R.E. (T.F.), London Electrical Engineers. (Territorial Decoration.)
 Monier-Williams, G. W., Captain 12th (Reserve) Battalion County of London Regiment.
 Moor, C. G., Captain, O.C. 1st London Sanitary Section, British Expeditionary Force.
 Murphy, Paul, 2nd Lieut. 23rd Battalion Middlesex Regiment.
 Nash, L. M., Captain 7th (Service) Battalion Gloucestershire Regiment.
 Neville, H. A. D., Captain Essex (Fortress) R.E.
 Norman, G. M., Corporal R.E.
 Okell, F. L., Singapore Maxim Company.
 Page, R. P., 2nd Lieut. 2/6th Battalion Hants. Regiment (T.F.).
 Poole, E. S., Temp. Lieut. A.O.D.
 Priest, M., Lieut. 1st London (City of London) Sanitary Company, R.A.M.C.
 Race, Joseph, Captain Canadian Army Hydrological Corps and Advisers on Sanitation.
 Read, W. J., R.A.M.C.
 Robison, R., Lieut. 1st London (City of London) Sanitary Company, R.A.M.C.
 Ross, R. St. G., Major 2/3rd Battalion East Lancashire Regiment.
 Ryffel, J. H., Lieut. University of London O.T.C. (Medical Section).
 Sawbridge, B. F., 2nd Lieut. 3rd London Rifle Brigade, 5th Battalion City of London Regiment.
 Shelton, J., Singapore Volunteer Rifles.
 Shepherd, E. H., Corporal R.E.
 Simmons, T. A., Temp. Lieut. A.O.D.
 Smith, F., Major-General, C.B., C.M.G., Army Veterinary Service.
 Smith, T. A., Lieut. 5th Battalion Lincolnshire Regiment.
 Stanley, Harry, Lieut. 2/4th Battalion Gloucestershire Regiment.
 Stone, O. J., Royal Field Artillery.
 Stubbs, J. R., Temp. Lieut. A.O.D.
 Symons, W. H., Major R.A.M.C. (T.F.).
 Thompson, J., O.T.C.
 Trotman, S. R., Captain, O.C. University College, Nottingham, O.T.C.
 Wade, F., Sergeant Hants. Royal Engineers (Electric Light Companies).
 Willecox, W. H., Lieut.-Colonel R.A.M.C. (T.F.).

ASSOCIATES.

- Allan, J. L. S., Lieut. 7th Battalion King's Own Scottish Borderers (killed in action).
 Amoores, R. L., 2nd London Sanitary Company, R.A.M.C. (T.F.).

- Bainbridge, J. S., 2nd Lieut. 4th Battalion Yorkshire Regiment.
 Bate, S. C., St. Andrews University O.T.C.
 Bunker, S. W., 2nd Lieut. 1st Battalion Royal Fusiliers.
 Cheke, T. W., Corporal R.E.
 Chown, C. R., 2nd Lieut. R.F.A.
 Christie, J. H., Corporal R.E.
 Clark, W. S., Corporal R.E.
 Collins, C. G., Corporal R.E.
 Crawford, F. A. F., Captain 5th Battalion Royal Scots Fusiliers.
 Crawford, J., 15th Battalion Argyll and Sutherland Highlanders.
 Cunningham, A., 5th Battalion Scottish Rifles.
 Davidson, A. L., Gordon Highlanders.
 Dawson, D. S., Corporal R.E.
 Dingwall, A., 2nd Lieut. General List (attached R.E.).
 Doidge, R. M., Acting Sergeant-Major R.E.
 Dunn, R. J., 2nd Lieut. 12th Battalion Royal Warwickshire Regiment
 (reported missing).
 Eastburn, G. J., Driver A.S.C.-M.T., attached M.M.-G.S.
 Fielding, J. F. P., Squadron Sergeant-Major 2nd Battalion County of
 London Yeomanry.
 Frazer, D. R., 2nd Lieut. 13th (Service) Battalion Worcestershire Regiment.
 Gemmell, A., Lieut. Edinburgh University O.T.C.
 Georgi, C. D. V., 2nd Lieut. 13th Battalion Royal Fusiliers.
 Gilmour, H., 2nd Lieut. 8th Battalion South Lancashire Regiment.
 Harding, Gilbert, Corporal R.E.
 Harris, J. W., 2nd Lieut. 3rd Battalion Lincolnshire Regiment (Special
 Reserve), British Expeditionary Force (died on active service).
 Hay, J. G., Corporal R.E.
 Honneyman, W., Corporal R.E.
 Jones, E. O., 2nd Lieut. 7th Battalion East Yorkshire Regiment.
 Kent-Jones, D. W., Corporal R.E.
 Lambourne, H., 2nd Lieut. 14th Battalion Sherwood Foresters.
 Laughton, F. E., 2nd Lieut. 4th Battalion Queen's Own Cameron High-
 landers. (Military Cross.)
 Masters, E. A., Captain 2nd London Division Transport and Supply
 Column, A.S.C.
 Miller, J. B., Captain City of Aberdeen Fortress Royal Engineers.
 Norris, R. V., 2nd Lieut. 114th Mahrattas.
 Norris, W. H. H., 2nd Lieut. R.E.
 Norton, H. R., Corporal R.E.
 Pattison, J. W. H., Captain 8th Battalion Scottish Rifles (T.F.).
 Phillips, H. A., Friends' Ambulance Unit (Red Cross).
 Potter, F. M., Corporal 14th Battalion County of London Regiment (London
 Scottish), British Expeditionary Force.
 Rayner, E. A., Corporal R.E.
 Rideal, E. K., Lieut. (General List).

- Robertson, Stewart, 3rd (Reserve) Battalion Royal Inniskilling Fusiliers.
 Roos, C. B., Corporal R.E.
 Saunders, W. G., Lieut. 5th Battalion King's Liverpool Regiment,
 British Expeditionary Force.
 Smeaton, T. F., Lieut. R.E.
 Smith, E. W., 1st London Sanitary Company, R.A.M.C. (T.F.).
 Solomon, J. B., Sergeant 28th Battalion County of London Regiment
 (Artists Rifles), British Expeditionary Force.
 Thurston, F. S., Sergeant Civil Service Rifles.
 Vernon, Harold, Corporal R.E. (killed in action).
 Walker, F. G. C., Lieut. R.E. (Military Cross.)
 Wheatley, R., Corporal R.E.
 Wheeler, E. G. G., University of London O.T.C.
 White, F. D., 2nd Lieut. 13th Battalion Highland Light Infantry.
 White, J. C., 2nd Lieut. 7th (Service) Battalion Border Regiment. (Military
 Cross.)
 Wilson, Arthur, 2nd Lieut. 4th Battalion Leinster Regiment.
 Wilson, Lothian, Major O.C. 19th Divisional Supply Column, A.S.C., British
 Expeditionary Force.
 Wright, Thomas, 2nd Lieut. 2nd Battalion Royal Berkshire Regiment
 (killed in action).

STUDENTS.

- Abelson, P., 1/2nd Sanitary Section, R.A.M.C.
 Archibald, J. D., Lieut. 10th (Service) Battalion Essex Regiment
 Bachrach, R., Lance-Corporal London Electrical Engineers (T.F.).
 Bagshaw, W. N., 2nd Lieut. 2/4th Battalion York and Lancaster
 Regiment (T.F.).
 Barry, W. R., Lieut. Royal Naval Division.
 Beecroft, S. B., Royal Naval Division.
 Beesley, R. M., 28th Battalion County of London Regiment (Artists Rifles)
 British Expeditionary Force.
 Berridge, J. D., 2nd Lieut. 10th Battalion South Lancashire Regiment.
 Bishop, J. E., Captain 10th (Service) Battalion East Lancashire Regiment.
 Bishop, R. O., Hon. Artillery Company (Infantry Battalion).
 Bowyer, E. G., Trooper 4th Battalion Mounted Rifles.
 Boyd, Gavin, 2nd Lieut. 14th Battalion Argyll and Sutherland High-
 landers.
 Brooke, H. W., 2nd Lieut. 7th (Service) Battalion East Yorkshire Regiment.
 Bruckman, R. T., Lieut. 2/4th Battalion Border Regiment.
 Bull, P. C., Captain 8th (Service) Battalion Suffolk Regiment.
 Bunbury, H. M., Bristol University O.T.C.
 Butler, F. H. C., 4th (1st Reserve) Battalion Hampshire Regiment.
 Buttrick, H. P., Corporal R.E.

Carlisle, W. F., Corporal R.E.
 Carson, S. D., 2nd Lieut. 7th Battalion Royal Scots Fusiliers.
 Chalmers, F. G. D., Corporal R.E.
 Chitty, E. C., Corporal R.E.
 Clark, L. M., 14th Battalion County of London Regiment (London Scottish)
 Clark, Robert, Lothian and Border Horse.
 Clarke, F. G., R.A.M.C., 2/2nd Casualty Clearing Station.
 Clarke, L. H., Corporal R.E.
 Clement, J., 2nd Lieut. 10th (Service) Battalion Hampshire Regiment.
 Collen, F. D., 2nd Lieut. 4th Battalion Notts. and Derby. Regiment.
 Cooper, H. E., Lieut. R.E.
 Cooper, William, 2nd Lieut. R.E. (Military Cross.)
 Cottrall, L. G., Corporal R.E.
 Cowlshaw, G. D., 12th (Service) Battalion York and Lancaster Regiment.
 Dalton, John, 28th Battalion County of London Regiment (Artists Rifles),
 British Expeditionary Force.
 Dennett, S. H., 2nd Battalion City of Birmingham.
 Doidge, H. F., Captain A.S.C. (Analytical Chemist).
 Dovey, E. R., Hongkong Volunteers.
 Dunsmore, Adam, Corporal R.E.
 Figg, E. F., Corporal R.E.
 Follows, G. S., 2nd Lieut. 12th (Service) Battalion King's Liverpool Regiment.
 Forrester, C., 2nd Class Air Mechanic, Royal Flying Corps (Chemical
 Analyst).
 Fraser, F. J., 10th Battalion Liverpool Scottish.
 Frith, J. S., 4th Battalion (Prince of Wales' Volunteers) South Lancashire
 Regiment.
 Gale, R. C., 2nd Lieut. Royal Garrison Artillery.
 Galletly, C. H., Corporal R.E.
 Garland, T., Corporal R.E.
 Garnett, K. G., A.B. Seaman on H.M.S. *Sagitta*.
 Geake, Arthur, Corporal R.E.
 Gibson, Stanton, 2nd Lieut. A.C.C.
 Gosney, H. W., 28th Battalion County of London Regiment (Artists Rifles).
 Greaves, Reginald, Corporal R.E.
 Hand, P. G. T., Corporal R.E.
 Haselhurst, H. W., Captain 9th Battalion Northumberland Fusiliers.
 Hatfield, C. G. M., Lieut. 18th Battalion Middlesex Regiment (Pioneers).
 Haythornthwaite, A., 2nd Lieut. R.F.A.
 Hayward, C. O., 2nd Lieut. 7th Battalion Lincolnshire Regiment.
 Henry, John, Lieut. 4th Battalion Royal Scots Fusiliers.
 Himus, G. W., Corporal R.E.
 Hislop, S. L., Corporal R.E.
 Hodgkin, A. E., Captain 5th Battalion Cheshire Regiment.
 Holt, H. D. G., 2nd Lieut. 15th (Service) Battalion Royal Fusiliers.

- Hornby, A. J. W., 2nd Lieut. 14th Division R.F.A., British Expeditionary Force.
- Hunwicke, R. F., Chief Petty Officer R.N.A.S., Mobile Anti-Aircraft Section.
- Islip, H. T., Corporal R.E.
- Johnson, J. C., Corporal R.E.
- Jones, G. J., 2nd Lieut. 9th Battalion South Wales Borderers (attached 3rd).
- Joynson, George, 11th Battalion Lancashire Fusiliers.
- Kind, R. G., Corporal W.B.M.B.F.A. (Cheshire R.A.M.C.).
- King, John, University College, Nottingham, O.T.C.
- Lea, H. T., Corporal R.E.
- Le Brocq, L. F., Lance-Corporal 23rd Battalion London Regiment.
- Lever, D., Corporal R.E.
- Levingston, H. G., 2nd Lieut. A.S.C.
- Linzell, L., Staff-Sergeant A.V.C., Base Veterinary Hospital (T.) No. 1.
- Loaring, W. C., Lieut. (General List).
- Lynch, G. Roche, Temporary Surgeon, Royal Naval Hospital, Malta.
- MacCulloch, A. F., Lieut. City of Edinburgh Battery, 1st Lowland Brigade R.F.A.
- Mackay, R. L., 2nd Lieut. 13th Battalion Argyll and Sutherland Highlanders.
- Mackenzie, P., 2nd Lieut. 14th Battalion Argyll and Sutherland Highlanders.
- Maclean, Alexander, R.E.
- McDougall, Duncan, Corporal R.E.
- McLachlan, T. M., 58th Field Ambulance, R.A.M.C.
- Mendoza, E., 8th (Cyclist) Battalion Essex Regiment (attached to Royal Aircraft Factory).
- Merheim, G., Corporal R.E.
- Mitchell, C. A. D., 2nd Lieut. 4th (Reserve) Battalion Devon Regiment (T.F.).
- Moore, G. W., Corporal R.E.
- Morrison, Norman, 2nd Lieut. 15th Battalion King's Liverpool Regiment.
- Muggeridge, H. D., 2nd Lieut. 8th (Service) Battalion Royal Sussex Regiment.
- Mumford, E. M., Captain Lancashire Fusiliers.
- Murray, K. F. M., Lieut. 1st Battalion North Staffordshire Regiment, British Expeditionary Force.
- Needs, F. E., Corporal Motor Cycle Despatch Rider, Army Signals, R.E., British Expeditionary Force.
- Nelson, W. R. F., University of London O.T.C.
- Newitt, L. D., Lieut. Royal Artillery.
- Nixon, C. J., 2nd Lieut. 3 5th Battalion Bedfordshire Regiment (T.F.).
- Norman, D. J., Corporal R.E.
- Northover, R., Lieut. 2nd Battalion Lancashire Fusiliers, British Expeditionary Force.
- Oates, F., Sergeant R.E.

- Parker, H. V.**, 2nd Lieut. R.F.A.
Paterson, T. McL., Corporal R.E. (died of wounds).
Patterson, A. A., 2nd Lieut. 6th Battalion Border Regiment.
Pickard, C. E., 2nd Lieut. 8th Battalion North Staffordshire Regiment.
Pollard, H. E., Friends' Ambulance Unit.
Potter, J. H., Corporal R.E.
Pulman, A. D. R., 2/7th Battalion Devon Cyclists.
Richards, E. M., Corporal R.E.
Roberts, E. J., Cadet, University of Wales O.T.C.
Robertson, J. A., 9th Battalion Gordon Highlanders, Highland Light Infantry.
Robinson, A. A., Lieut. R.G.A.
Rogers, E. W., Lieut. 11th (Service) Battalion West Riding Regiment.
Ross, Kenneth, 2nd Lieut. 4th Battalion Royal Irish Rifles (killed in action).
Ruddock, F. A., 12th Battalion York and Lancaster Regiment.
Rudolf, M. E. S., Corporal R.E.
Sadler, F., 9th Battalion Durham Light Infantry.
Sanderson, F. W., Sergeant R.E.
Senior, Alan, Lieut., 4th Battalion West Riding Brigade, R.F.A.
Shipston, G. T., Lieut. 2 5th Battalion Leicestershire Regiment.
Silvester, W. A., Cadet Sheffield University O.T.C.
Smith, G. E., 2nd Lieut. 3rd Battalion Argyll and Sutherland Highlanders (killed in action).
Smith, L. P., 2nd Lieut. 57th Company, R G.A. (deceased).
Snow, W. A., Corporal R.E.
Spicer, J. I., Lieut. 7th Battalion East Lancashire Regiment.
Spiers, C. W., Corporal R.E.
Stearn, J. H., 2nd Lieut. 14th Battalion Durham Light Infantry.
Steele, A. R., 2nd Lieut. 12th (Res.) Battalion Scottish Rifles.
Stephens, H. C., Corporal R.E.
Stockdale, E. L. J., Lieut. 10th (Service) Battalion Lancashire Fusiliers.
Suckling, Ernest V., Sergeant R.A.M.C., Mobile Analytical Laboratory, British Expeditionary Force. (Mentioned in Despatches, Jan. 1st, 1916.)
Sugden, J. N., Lieut. (General List).
Taylor, C. B., 47th (London) Division, 3rd London Field Company, R.E., British Expeditionary Force.
Taylor, H. A., Hongkong Volunteers.
Thompson, S. G., 2/1st Battalion West Kent Yeomanry.
Thomson, M. S., Cambridge University O.T.C., Field Ambulance Section.
Tye, A. G., 3rd Battalion Hon. Artillery Company.
Ward, E. C., 2nd Lieut. A.S.C., Mechanical Transport, British Expeditionary Force.
Watt, J. J., 3/28th Battalion London Regiment (Artists Rifles).
Webb, H. M., Lieut. (General Service List)
Webster, H. G., Corporal R.E.

Whitham, R. P. M., 2nd Lieut. 15th Battalion Northumberland Fusiliers.
 Whitworth, A. B., Corporal R.E.
 Williamson, C. G., 2nd Lieut. 13th (Reserve) Battalion Royal Warwickshire Regiment.
 Wilson, D. M., 2nd Lieut. 16th Battalion Royal Fusiliers, attached 28th Battalion London Regiment. (Military Cross.)

CANDIDATES FOR EXAMINATION.

Brekke, L. O., 2nd Lieut. 7th Battalion East Yorkshire Regiment.
 Child, A. J., 2nd Lieut. 28th Battalion County of London Regiment (Artists Rifles), British Expeditionary Force.
 Childs, Hugh, Lieut. (General List.)
 Cunnew, G. A., 2nd Lieut. 7th (Service) Battalion Royal Berkshire Regiment.
 Cunningham, F. W. B., 2nd Lieut. A.S.C.
 Janson, J. T., 2nd Lieut. 7th Battalion King's Own Yorkshire Light Infantry.
 Leitch, Eoin, Lieut. 5th Battalion Argyll and Sutherland Highlanders.
 Levy, J. F., 10th Battalion Royal Fusiliers (City of London Regiment).
 McConnan, James, 2nd Lieut. 14th Battalion Manchester Regiment.
 Meads, J. A., 12th Battalion Sherwood Foresters.
 Quibell, A. H., Captain 2/8th Battalion Sherwood Foresters.
 Rait, P. W., Corporal R.E.
 Reynard, H. C., 2nd Lieut. 10th Battalion East Surrey Regiment.
 Sewill, J. W., 2nd Lieut. 5th Battalion London Rifle Brigade (T.F.).
 Snell, F. S., 2nd Lieut. 6th Battalion Royal Berkshire Regiment.
 Stigand, I. A., 5th Battalion Royal West Kent Regiment (transport officer).
 Tayler, H. F., 2nd Lieut. R.G.A.
 Thin, R. G., 2nd Lieut. 4th Battalion King's Own Scottish Borderers (T.F.).
 Vinicombe, L. F., 2nd Lieut. 10th Battalion Devon Regiment.
 Vulliamy, B. L., Public Schools Brigade (2nd Battalion), Royal Fusiliers, City of London Regiment.
 Watson, J., Staff-Sergeant, 20th Sanitary Section.
 Webb, H. W., Royal Warwickshire Regiment (12th) 2nd Birmingham Battalion.

Junior Clerk, Office of the Institute:

Andrews, J. B., 11th (Service) Battalion County of London Regiment (Finsbury Rifles).

Proceedings of the Council.

NOVEMBER, 1915—JANUARY, 1916.

Examinations.—The Council have received the Reports of the Board of Examiners on the Intermediate and Final Examinations held in January, 1916. Dr. Harold G. Colman and Lieut.-Colonel Crossley being engaged on Government service were unable to act as Examiners for the Intermediate Examination and in General Chemistry. The Board therefore co-opted Dr. Arthur Harden, F.R.S., for that part of the work.

Glass Research.—The Advisory Council on Scientific and Industrial Research have allotted the Institute a grant of £400 for one year's research work on laboratory glass of various kinds, and a grant of £500 for research on optical glass, covering a period up to March 31st, 1916. The grants are made on certain conditions, providing for the use of the results by British firms on terms to be arranged between the Advisory Council, the Glass Research Committee, and the manufacturers concerned.

The Glass Research Committee have lately forwarded to the Advisory Council reports on formulas for—

15. Blue enamel for sealing metallic wire into glass.
16. Lead glass suitable for electric light bulbs.
17. Lead glass similar to above, but avoiding potassium carbonate.
18. Opal glass designed to join perfectly with glass made to the Committee's formulas Nos. 1 and 10.
19. High-temperature thermometer glass.

20. A leadless opal glass which unites with No. 19 and can be worked with it as an enamel backing for thermometers, etc.
21. Thermometer glass for ordinary temperatures.

The fact that these formulas are available has been reported to British glass makers, from whom a large number of applications have been received and are now under the consideration of the authorities.

With regard to research on optical glass, the Advisory Council have asked that the Glass Research Committee shall keep in touch with the National Physical Laboratory, to which a grant has also been allotted. The primary object of the work of the Laboratory will be "the study of the process and condition of melting and producing glass of good optical quality with special reference to refractories and electric furnace methods, with a view to putting the whole process of manufacture on a practical scientific basis."

The line of investigation undertaken by the Glass Research Committee of the Institute is "the study of certain specific optical glasses urgently required for industrial purposes, with a view to their early production by manufacturers."

Honorary War Degrees.—The Council have received from the Academic Registrar of London University a copy of a scheme for conferment of Honorary War Degrees on certain candidates who have served with the forces or have been engaged on Government work and have been thereby prevented from taking their final degree examinations. The Council have decided to consider, on their merits, the cases of candidates who have received such War Degrees, with a view to their admission to the examinations of the Institute. The Council feel that they cannot make any general ruling on the matter, and that in arriving at a decision in each case, they must be guided by a report from the College in which the Candidate was trained and the opinion of a recognised teacher with regard to the standard attained by the Candidate.

Army Recruitment.—The Royal Society has brought to the notice of the Institute the scheduling by the Board of Trade of the following reserved occupations :—

Chemists: Analytical, consulting, and research chemists (not to be accepted for immediate enlistment or called up for service with the Colours without the consent of the Royal Society).

In a supplementary list, the Committee on Reserved Occupations have included :—

In all industries: Works chemists.

A recent official announcement states that a mark is placed on the Army Register against the name of a man actually engaged in a reserved occupation. In the event, however, of any analytical, consulting, or research chemist being accepted for immediate enlistment or called up for service with the Colours, the chemist or his employer should at once point out to the Recruiting Officer that he belongs to a reserved occupation, and that the consent of the Royal Society is necessary. If there is reason to doubt whether the man is entitled to have a mark placed against his name in the Army Register, the Recruiting Officer may take steps to have the matter investigated by the Royal Society.

The Royal Society has appointed a Special Committee, of which the President of the Institute of Chemistry, as such, is a member, to consider cases arising under the above arrangements.

Platinum.—In view of the fact that platinum is urgently required for Government purposes, chemists who are in possession of platinum utensils and scrap for which they have no immediate need may dispose of it to one of the following firms, who have been authorised to buy all available platinum so offered :—

Messrs. Johnson, Matthey & Co., Ltd, 78, Hatton Garden,
London, E.C.

Messrs. Johnson & Sons, Ltd., 23, Cross Street, Hatton
Garden, London, E.C.

Messrs. Lees & Sanders, 15, Great Sutton Street,
Clerkenwell, London, E.C.

The Sheffield Smelting Co., Ltd., 1, Berry Street,
Clerkenwell, London, E.C.

Officers and Members of Council.—The Officers and Members of Council who retire at the Annual General Meeting on March 1st, 1916, under the provisions of Bye-law 30, are as follows:—*Vice-Presidents*: Sir Boverton Redwood, Bart., D.Sc., and Edward William Voelcker, A.R.S.M. *Members of Council*: Leonard Archbutt, Cecil Howard Cribb, B.Sc., George Embrey, Arthur Harden, D.Sc., F.R.S., Charles Alexander Hill, B.Sc., Edward Hinks, B.Sc., William Macnab, Frederick Wallis Stoddart, and James Woodward, B.A., B.Sc.

The Officers and Members of Council nominated for election in their stead are:—*Vice-Presidents*: Arthur Harden, D.Sc., F.R.S., and Herbert Jackson. *Members of Council*: Richard Bodmer,* Hugh Charles Herbert Candy, B.A., B.Sc., George Gerald Henderson, M.A., D.Sc., LL.D., Patrick Henry Kirkaldy, Alexander Lauder, D.Sc., Bedford McNeill, A.R.S.M., Gilbert Thomas Morgan, D.Sc., F.R.S., Dudley Northall-Laurie, George Stubbs, and Thomas Tickle, B.Sc.

Building.—Recent contributions to the Buildings Fund include a donation of £52 10s. from Messrs. Wood Bros. & Co., Ltd., Barnsley.

* In the place of Professor Herbert Jackson, who has been nominated a Vice-President.

Abstracts of the Reports of Examiners.

INTERMEDIATE AND FINAL (A.I.C.) EXAMINATIONS, JANUARY, 1916.

BOARD OF EXAMINERS.—(See pp. 10—11.)

The Examinations were held in the laboratories of the Institute from January 3rd to 7th inclusive.

Fourteen Candidates entered their names for these examinations, of whom 13 presented themselves. The results are shown in the following table:—

	NUMBER EXAMINED.	NUMBER PASSED.
Intermediate Examination	4	3
Final Examination:—		
Branch (a) : Mineral Chemistry ...	1	1
Branch (d) : Organic Chemistry ...	4	4
Branch (e) : The Chemistry and Micro- scopy of Food and Drugs, etc. ...	4	4
	<hr/> 13	<hr/> 12

Intermediate Examination.—The work of the Candidates who passed was generally satisfactory.

Final Examination.—In Branch (a) the Candidate satisfied the Board.

In Branch (d) the theoretical and practical work was of a more satisfactory character generally than has been the case in recent Examinations.

In Branch (e) the work as a whole was good, but it would have been more satisfactory if there had been clearer evidence from some of the Candidates of practical familiarity with the chemistry of fertilisers and feeding stuffs.

Candidates who passed the Intermediate Examination :

Cox, Henry Edward	...	...	...	B.Sc. (Lond.). With John Evans, F.I.C.
Somer, Arthur Joseph	...	...	...	The School of the Pharmaceutical Society, London; and with C. A. Hill, B.Sc., F.I.C.
Wells, Ernest Edmund	...	...	...	B.Sc. (Lond.). The University, Oxford.

Candidates who passed the Final Examination for the Associateship (A.I.C.) :

In Branch (a) Mineral Chemistry.

Browning, Ronald George	B.Sc. (Lond.). King's College, London.
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In Branch (d), Organic Chemistry.

Brightman, Rainald	B.Sc.(Lond.). Finsbury Technical College, London.
Brown, Robert Lidwill	...	...	...	A.R.C.S.I. The Royal College of Science for Ireland, Dublin.
Foster, Henry Stennett	...	...	...	Finsbury Technical College, London.
Hancock, Algie	...	...	...	University College, Nottingham.

In Branch (e). The Chemistry (and Microscopy) of Food and Drugs. Fertilisers and Feeding Stuff, Soils and Water.

Corfield, Charles Edwin	...	...	...	The School of the Pharmaceutical Society; and King's College, London.
Geake, Joseph John	...	...	...	Finsbury Technical College, London; and under R. E. Griffiths, B.Sc., A.I.C.
Pickworth, Frederick Alfred	...	...	...	B.Sc. (Lond.). With F. H. Lees, F.I.C.
Smith, Frederick	...	...	...	With the late J. Campbell Brown, D.Sc., F.I.C.; with W. Collingwood Williams, F.I.C.; and with George Embrey, F.I.C.

PAPERS SET AT THE JANUARY EXAMINATIONS.

Intermediate Examination.

GENERAL AND THEORETICAL CHEMISTRY.

TUESDAY, JANUARY 4th, 1916: 10 a.m. to 1 p.m.

(All the questions should be attempted.)

1. Explain the principles on which a particular atomic weight is assigned to an element, and show how these principles apply in the cases of the following elements :—argon, fluorine, iodine and nickel.

2. Describe the commercial preparation of phosphorus. How are phosphorus trichloride, phosphorus oxychloride, phosphonium iodide, phosphorous acid, phosphorus pentoxide and sodium pyrophosphate usually prepared?

3. Give an account of the characteristic properties of colloidal solutions, and indicate briefly what is the probable constitution of such solutions.

Describe how colloidal solutions of arsenic trisulphide, ferric hydroxide and metallic platinum can be prepared.

4. How would you explain each of the following phenomena :—

(a) An aqueous solution of normal sodium carbonate has an alkaline reaction.

(b) Methyl orange cannot be used as an indicator for the estimation of acetic acid by titration.

(c) When gaseous hydrogen chloride is passed into a solution of sodium chloride a precipitate is produced.

(d) When ammonia is added to a solution of magnesium chloride containing ammonium chloride no precipitate is produced.

5. Give an account of the chemical properties of the oxides of manganese and of the more important compounds to which they give rise.

6. What impurities would be likely to occur in the following substances and how would you detect them :—(a) copper sulphate, (b) sodium carbonate, (c) hydrochloric acid, (d) iodine, (e) zinc?

How would you prepare pure specimens of *any three* of the above from the commercial products?

2 p.m. to 5 p.m.

(All the questions should be attempted.)

1. Explain how you would proceed to ascertain the constitution of a hydrocarbon of the molecular formula C_4H_8 .

2. Describe how the molecular volume and molecular refractivity of a compound are determined, and explain how they are related to the composition and constitution of the compound.

3. Give a brief account of the methods used for the preparation of glycerol on the large scale. How can the following substances be prepared from glycerol: (a) acrylic acid, (b) isopropyl iodide, (c) allyl alcohol, (d) a fat?

4. Describe as fully as you can the preparation of either (a) diethylaniline, starting from benzene, or (b) quinoline, starting from benzene.

5. Describe the chief methods used in the laboratory for the reduction of organic compounds and give instances in illustration of the methods described.

6. Give a short general account of the methods of preparation and the properties of the hydroxy-derivatives of the aromatic hydrocarbons.

PRACTICAL CHEMISTRY.

WEDNESDAY, JANUARY 5th, 1916: 10 a.m. to 4.30 p.m.

1. The solution "A" contains a mixture of the sulphate, chloride and chlorate of potassium. Ascertain the amount of each salt present and express your result in grams of KCl, KClO₃, and K₂SO₄ per litre.

2. Examine and report on the inorganic substances "B" and "C" (sodium perborate, cryolite).

THURSDAY, JANUARY 6th, 1916: 10 a.m. to 4.30 p.m.

1. "D" is the acetyl derivative of an organic base. Determine the percentage amount of acetic acid yielded by the hydrolysis of the compound. Isolate the base, determine its boiling point, and ascertain whether it is a primary or a secondary base. Submit a specimen of the base for inspection (methyl aniline, *p*-toluidine; one to each candidate).

2. Examine and report on the organic compound E (*p*-chloro-phenol).

FRIDAY, JANUARY 7th, 1916: 10 a.m. to 4.30 p.m.

1. Make a qualitative analysis of the material "F" (basic slag).

2. Identify the carbohydrate "G," and determine its specific rotation (lactose).

Final Examinations for the Associateship.

Branch (a).—Mineral Chemistry.

MONDAY, JANUARY 3rd, 1916: 10 a.m. to 1 p.m.

(Only five questions need be attempted, of which No. 6 must be one.)

1. Compare the oxides and oxyacids of the halogens.

2. Describe a method of preparing the anhydrous chlorides of iron (ferrous and ferric), aluminium, titanium, and magnesium. Assuming that the raw materials are those obtainable commercially in quantity, state the probable impurities and their effect on reactions in which these anhydrous chlorides are employed.

3. Describe an arrangement for the sampling and analysis of flue gas from a steam boiler paying special attention to the presence of partially burnt products. What data, other than those resulting from the analysis, will be required for the calculation of the heat carried away by the flue gas?

4. Give an historical *résumé* of the experiments and reasoning establishing O_3 as the formula of ozone.

5. Discuss the bearing of the utilisation of by-products on the successful prosecution of a large scale inorganic chemical industry. Give details for one example.

6. Write an essay on one of the following :—

- (a) The relation of recent work in radioactivity to the periodic law.
- (b) The use of electrolytic methods in chemical manufacture.
- (c) Active nitrogen.

TUESDAY and WEDNESDAY, JANUARY 4th and 5th, 1916 :

10 a.m. to 4.30 p.m.

1. Report on the composition of the boiler scale, and state your view as to the cause of its production. A complete analysis will be expected, but greater accuracy than that required to form a definite opinion is not called for.

2. Make a complete analysis of the sample (manganese bronze).

(These exercises may be continued on the following days. An additional exercise will be given on Thursday.)

THURSDAY, JANUARY 6th, 1916 : 10 a.m. to 4.30 p.m.

1. Prepare a specimen of pure ferric ammonium alum from ferrous sulphate and prove the purity of your product.

Branch (d).—Organic Chemistry.

MONDAY, JANUARY 3rd, 1916 : 10 a.m. to 1 p.m.

(Five questions only to be attempted.)

1. Give an account of the preparation and properties of the technically important organic substances which can be conveniently manufactured from calcium carbide.

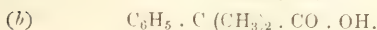
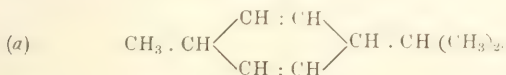
2. Discuss the various conditions under which the halogens react with organic substances, illustrating your answer by the quotation of actual examples.

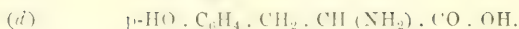
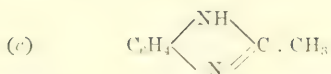
3. Describe the chemical behaviour of orthophenylene-diamine and show what important classes of organic compounds can be derived from this substance.

4. Write a summary of the results which have been obtained by the application of enzymes to laboratory synthetic operations.

5. How are the following substances prepared? Coal tar, saccharin, acetylsalicylic acid, purpurin, sulphonal and veronal.

6. Suggest methods for the synthesis of three out of the four compounds whose constitutional formulæ are given below :—





TUESDAY and WEDNESDAY, JANUARY 4th and 5th, 1916 :

10 a.m. to 4.30 p.m.

1. You are provided with 250 c.c. of an organic liquid (A) which can be cheaply manufactured. Examine and report upon it, (a) as to its nature, (b) as to its possible industrial applications.

2. The bottle (B) contains 5 grams of an aliphatic hydroxy-compound. Identify the substance by the preparation and quantitative hydrolysis of its acetyl-derivative.

THURSDAY and FRIDAY, JANUARY 6th and 7th, 1916 :

10 a.m. to 4.30 p.m.

1. The liquid (C) consists of 200 c.c. of a technical preparation of mononitrotoluene. Ascertain the percentage of the *o*-, *m*-, and *p*- isomerides contained therein.

2. Fit up an apparatus by means of which you would propose to make 200 grams of liquid ethyl chloride. Leave it for the inspection of the examiner.

Branch (c).—The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding-Subs, Soils, and Water.

MONDAY, JANUARY 3rd, 1916 : 10 a.m. to 1 p.m.

1. State what you know of the legal provisions controlling the composition of butter and of margarine offered for sale in this country.

2. Describe several methods for the accurate determination of fat in milk, noting which are applicable only to fresh milk and which are available also for the analysis of sour milk. Indicate any special preference you personally may have for any one or more of these methods, giving briefly your reasons.

3. Explain how you would determine the proportion (a) of "tar acids" in a sample of creosote, and (b) of available chlorine in a sample of "chloride of lime."

(Answer in a separate book.)

1. Give a full account of the symptoms observed in subacute and chronic poisoning by arsenical compounds. State what you know about the modern therapeutic use of organic compounds of arsenic.

2. Describe fully the physical and chemical properties of hydrocyanic acid. What is the general nature of the substances which, occurring naturally in plants, yield HCN on fermentative decomposition? Give an account of the distribution of such substances and indicate the nature of the decomposition they undergo.

3. Give the medicinal doses of Acidum Carbolicum liquifactum, Acidum Hydrochloricum dilutum: Cocainae Hydrochloras, Atropinae Sulphas, Morphinae Acetas. Of the following give the composition and dose: Liquor Arsenicalis, Tinctura Camphorae Composita, Tinctura Nucis Vomicae, Vinum Antimoniale, Vinum Ipecacuanhae, Pulvis Ipecacuanhae composita.

MONDAY, JANUARY 3rd, 1916: 2 p.m. to 5 p.m.

1. Identify as fully as possible each of two poisonous alkaloids present as pure salts in the aqueous fluid A. V.E.D.

2. Identify microscopically the various fibres present in B.

3. The slides C to F contain preparations of parasites which affect cereals. Identify them and write a short account of each.

Oral Examination in the Recognition of Drugs and Chemicals.

TUESDAY, JANUARY 4th, 1916: 10 a.m. to 4.30 p.m.

Analyse as fully as you can in one day's work the sample of cocoa mixture, and report on the approximate proportions of its ingredients. (The determination of theobromine need not be attempted.)

WEDNESDAY, JANUARY 5th, 1916: 10 a.m. to 4.30 p.m.

1. Analyse and report as fully as you can on the samples of (a) liniment of camphor, and (b) sweet spirit of nitre.

2. Placed before you are the results of chemical analysis and bacterioscopic examination of three samples of water. Consider these, and frame reports, as concise as possible, based upon the data submitted.

THURSDAY, JANUARY 6th, 1916: 10 a.m. to 4.30 p.m.

1. Determine the "original gravity" of the sample of beer.

2. Determine the Ca, Mg, SO_4 and Cl contained per litre in the "mineral" water. (Special stress is placed on the quantitative accuracy of these determinations).

FRIDAY, JANUARY 7th, 1916: 10 a.m. to 4.30 p.m.

1. Determine the nitrogen in the linseed cake submitted to you, and examine it for the presence of any objectionable impurity.

2. Determine the phosphoric acid in the sample of fish guano.

3. Recognise by inspection the various specimens of fertilisers and feeding stuffs shown to you.

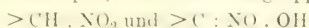
Candidates for the Final Examination were required to translate passages from French and German technological literature.

TRANSLATION.

JANUARY 3RD, 1916 : Time allowed : 1½ hour.

Translate into English.

Erscheinungen, welche an die oben besprochenen Umsetzungen der Carbonylverbindungen mit den Alkylnitriten und den Carbonylverbindungen selbst erinnern, waren bereits bei den Nitroparaffinen zu besprechen. Man erkennt leicht in der Wirkung der Nitrogruppe und der Carbonylgruppe einen gewissen Parallelismus und kann die Ursache hierfür in dem ungesättigten Charakter der beiden Gruppen (Vorkommen mehrfacher Bindungen) suchen. Die Frage liegt nun nahe, ob—ähnlich wie die Nitrokörper in zwei desmotropen, durch die Atomgruppierungen :



charakterisierten Formen auftreten können—auch bei den Carbonylverbindungen sich die Erscheinung der Desmotropie zwischen den Formen :



zeigt. Die zweite (hydroxylhaltige) dieser Formen würde einen ungesättigten Alkohol darstellen : man bezeichnet solche Verbindungen aus später darzulegenden Gründen (vgl. Kap. 15) als "Enole," den Uebergang von Carbonylverbindungen in Enole dementsprechend als "Enolisation."

Bei den Körpern, welche mehrere Carbonylgruppen enthalten, werden wir später Fälle kennen lernen, in denen mit grosser Wahrscheinlichkeit eine Enolisation anzunehmen ist, und auch solche Fälle, in denen die beiden desmotropen Formen als gesondert existenzfähig nachgewiesen sind. Bei den einwertigen Aldehyden und Ketonen, welche den Gegenstand dieses Kapitels bilden, liegen indes sichere Anhaltspunkte für die Enolisation nicht vor. Doch ziehen manche Autoren eine solche in Betracht, indem sie gewisse Reaktionen auf Grund der Annahme diskutieren, dass die Aldehyde und Ketone unter geeigneten Bedingungen ein im Gleichgewicht befindliches Gemisch der Carbonylform und der Enolform darstellen. *Meyer-Jacobson.*

A Niagara, l'on combine l'azote et l'oxygène de l'air sous l'action de l'électricité pour fabriquer l'acide azotique et les azotates d'une façon industrielle.

Après avoir dépouillé l'air de la vapeur d'eau par refroidissement, on le fait passer dans une chambre où il se trouve en présence d'arcs électriques de haute tension et de faible intensité.

Dans le procédé exposé par la *Atmospheric Products Company*, où l'on fait passer un courant électrique dans un mélange d'oxygène et d'azote pour obtenir la combinaison de ces deux gaz et former de l'acide azotique, il résulterait que le rendement en acide azotique dépend surtout du rapport entre la quantité d'énergie électrique employée et la quantité du mélange gazeux soumise à son action, et du courant en usage.

Avec la décharge silencieuse et la décharge disruptive, les rendements seraient faibles.

Dans ce procédé l'arc est employé, et le maximum de rendement s'obtiendrait avec l'arc électrique qui laisse passer le minimum de courant.

Enfin, on a préparé des azotates dont l'acide nitrique avait été obtenu en faisant traverser un tube à ozone par de l'air soumis à l'effluve électrique.

—H. De La Cour.

The Register.

Since the publication of Proceedings, Part IV., in December, 1915, the Council have elected 1 new Fellow and 9 new Associates ; 8 Associates have been elected to the Fellowship, and 9 Students have been admitted.

The deaths of 3 Fellows, 1 Associate, and 4 Students have been reported.

New Fellow.

Wood, Joseph Turney, 62, Park Road, Nottingham.

Associates Elected to the Fellowship.

Bailey, Alan, Milsom, 20, Duckett Road, Harringay, London, N.

Coates, Mrs. Ada Maria, M.Sc. (Birm.). 27, Crompton Road, Handsworth, Birmingham.

Krall, Hans, B.A. (Dublin), M.A.-O. College, Aligarh, U.P., India.

Naylor, Jonathan Harold, M.Sc. (Manc.). 1, Roseleigh Avenue, Burnage Lane, Levenshulme, Manchester.

Rayner, Archibald, B.Sc. (Lond.), Normanhurst, Alexandra Park Road, London, N.

Reynard, Otto, B.A. (Cantab.), 3, Selbourne Villas, Manningham, Bradford.

Robb, Marshall Jeffreys, B.Sc. (Aberd.), Westbank, Fonthill Road, Aberdeen.

Shepherd, Evelyn Henry, B.Sc. (Lond.), 125, Luton Road, Chatham.

New Associates.

Arundel, Edgar, B.Sc. (Lond.), 99, Poppleton Road, Leytonstone, London, N.E.

Brightman, Rainald, B.Sc. (Lond.), c/o Messrs. Price's Co., Ltd., Belvedere, Kent.

Browning, Ronald George, B.Sc. (Lond.), Belswains, Ersham Fields, Canterbury.

Corfield, Charles Edwin, 17, Bloomsbury Square, London, W.C.

Foster, Henry Stennett, 95, Gipsy Hill, London, S.E.

Geake, Joseph John, St. Bernards, York Road, Guildford.

Hancock, Algie, 315, Nottingham Road, Nottingham.

Pickworth, Frederick Alfred, B.Sc. (Lond.), c/o Mr. Robinson, 70, Highfield Road, Dartford, Kent.

Smith, Frederick, 62, Oval Road, Gravelly Hill, Birmingham.

New Students.

Bakes, William Edgar, 10, Cleveland Street, Holgate Road, York.
 Brisley, Charles William, 155, Croxted Street, Dulwich, London, S.E.
 Davies, William Everard, 5, Tynybedw Terrace, Treorchy, Glam.
 Goodwin, Stuart Wycliffe, Orchardleigh, Pinner, Middlesex.
 Hoff, Ronald William, 92, New Rowley Street, Walsall.
 Mann, Donald, Sunnyside, Earls Colne, Essex.
 Savage, Herbert, 48, Portsdown Road, Maida Vale, London, W.
 Sensicle, Laurence Henry, Tirmabellis, near Pontypridd.
 Stewart, Guy Somerville, Copland Cottage, Ealing Road, Wembley,
 Middlesex.

DEATHS.

Fellows.

Meldola, Raphael, D.Sc., LL.D., F.R.S.
 Patterson, Thomas Law.
 Smith, George.

Associate.

Vernon, Harold, B.Sc. (Lond.). (Killed in action.)

Students.

Milliken, Ralph Smith.
 Paterson, Thomas McIlvean. (Died of wounds.)
 Ross, Kenneth, B.Sc. (Lond.). (Killed in action.)
 Smith, John Frew.

Change of Name.

FELLOWS.

Feilmann, Martin Ernest, B.Sc. (Lond.); Ph.D. (Bâle), to Fyleman.
 Guttman, Leo Frank, Ph.D. (Heidelberg), A.C.G.I., to Goodwin.
 Reinherz, Otto, B.A. (Cantab.) to Reynard.
 Sohn, Charles Emile, to Soane.

ASSOCIATE.

Steinberg, David Bernard, B.Sc. (Lond.), to Stanhill.

STUDENT.

Uffelman, Adolf William Henry, to Upton.

General Notices.

Examinations.—The Council have given notice that examinations are suspended until further notice ; but in view of the fact that a number of Candidates wish to present themselves in July, the Council will reconsider the question in March. All Candidates who desire to present themselves for examination in July next are requested to communicate with the Registrar.

Examination in Biological Chemistry.—An Examination in Biological Chemistry, Bacteriology, Fermentation, and Enzyme Action will be held in October, 1916.

Notice to Associates. — Associates elected prior to February, 1913, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry, for at least three years since their election to the Associateship, may obtain forms of application for election to the Fellowship.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in making known suitable appointments for professional chemists.

British Industries.—A British Industries Fair is to be held by the Board of Trade in the ground-floor courts of the Victoria and Albert Museum, on February 21st to March 3rd. The manufactures included in the exhibition will be : (1) toys and games ; (2) china and earthenware ; (3) glass ; (4) fancy goods ; and (5) printing and stationery.

BUILDING FUND.

A sum of approximately £1,240 is now required to settle all accounts in respect of the building and equipment.

THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED, 1877.
INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,
1916.

PART II.

OFFICERS, COUNCIL, AND COMMITTEES, 1916-17.

ANNUAL GENERAL MEETING, MARCH 1st, 1916.

THE ADDRESS OF THE PRESIDENT:

SIR JAMES J. DOBBIE, LL.D., D.Sc., F.R.S.

PROCEEDINGS OF THE COUNCIL (FEBRUARY—MARCH, 1916).

OBITUARY.

THE LIBRARY.

MEMBERS AND STUDENTS WITH THE FORCES.

CHANGES IN THE REGISTER.

NOTICES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,
April, 1916.

LIST OF OFFICERS AND COUNCIL

For the Year ending March 1st, 1917.

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ARTHUR HARDEN, D.Sc., F.R.S.
OTTO HEHNER.
HERBERT JACKSON.
ARTHUR SMITHELLS, B.Sc., F.R.S.

HON. TREASURER:

ALFRED GORDON SALAMON, A.R.S.M.

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RICHARD BODMER.
WILLIAM THOMAS BURGESS.
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CHARLES FREDERICK CROSS, B.Sc.
ALEXANDER FINDLAY, M.A., D.Sc.
GEORGE GERALD HENDERSON, M.A., D.Sc., LL.D.
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THOMAS TICKLE, B.Sc.
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EDWARD WILLIAM VOELCKER, A.R.S.M.

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ARTHUR WILLIAM CROSSLEY, D.Sc., Ph.D., F.R.S.

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RICHARD BERTRAM PILCHER.

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* CHAIRMAN.

† VICE-CHAIRMAN.

THIRTY-EIGHTH ANNUAL GENERAL MEETING.

WEDNESDAY, MARCH 1st, 1916.

THE Thirty-eighth Annual General Meeting of the Institute of Chemistry of Great Britain and Ireland was held at 30, Russell Square, London, W.C., on Wednesday, March 1st, 1916, at 4.30 p.m.; Sir James J. Dobbie, President, in the Chair.

The minutes of the Thirty-seventh Annual General Meeting having been read and confirmed, Mr. A. Gordon Salamon, Honorary Treasurer, moved, Mr. David Howard seconded, and it was resolved: "That the Financial Statements for the year 1915 be received and adopted, and that a vote of thanks be accorded to the Honorary Auditors for their services."

The Honorary Treasurer said that as the Institute had not yet occupied the new premises for a complete financial year under normal conditions, it was rather difficult to make an exact estimate of its financial position as affected by the removal.

The expenditure so far as ordinary items were concerned had been watched with some care, and certain temporary economies had been effected, particularly in printing and postage. Other items, such as rent, rates and taxes, salaries and house expenses had increased.

On the receipts side, he was gratified to report that, in spite of the times, the amount of the receipts under sub-

scriptions was not seriously reduced. The amount for entrance fees was lower in view of the number of Associates serving with the forces who had postponed making application for Fellowship. The amount for dividends was somewhat inflated by the temporary holding of £2,800 $4\frac{1}{2}$ per cent. War Loan Stock, against which a higher rate of interest to the bank had to be paid. He hoped it would be possible to realise some of the investments in the near future and clear off the indebtedness.

In any case, without taking into account the value of the building and lease, and legacies amounting to £1,500, there was a balance of about £7,000 in assets beyond liabilities.

He remarked that the work of the Honorary Auditors had been unusually heavy, but would, in future, be reduced when the Building Fund was completed.

Mr. David Howard said that, in view of the difficulties with which the Council and the Finance Committee had to contend, the building trades dispute and the effect of the war on labour, he felt that the members should be not only satisfied with the result, but thankful to the Council, and especially to the Honorary Treasurer, for their care of its financial interests. The Institute had done good work both for the profession and the country since the outbreak of war.

Dr. Percy E. Spielmann, in returning thanks on behalf of the Honorary Auditors, suggested that the time had come for the Council to consider the advisability of employing professional auditors.

Sir William Tilden moved, Mr. A. Chaston Chapman seconded, and it was resolved: "That the Report of Council be received and adopted."

Sir William Tilden first referred to the losses sustained by chemistry in the past year, particularly in consequence of the deaths of Dr. Hugo Müller, Sir Henry Roscoe and Professor Meldola. The services of our late President to science and the world of industry were well known and could be ill spared at the

present time. He alluded also to the fact that of the 350 or more Members and Students of the Institute on active service, eight had been killed. He hoped that when the war was over the Institute would find a place on its walls for some memorial in honour of those who had thus laid down their lives.

He was specially interested to note the impulse given by the Institute to the production of laboratory materials and apparatus. The success achieved in this direction was highly creditable to those primarily concerned, and every chemist in the country must feel indebted to Professor Jackson for the skill, energy and knowledge he had brought to bear on the problem of glass. He was gratified to know that the value of the work had been recognised by a grant from the Advisory Council on Scientific and Industrial Research. He hoped chemists would support British manufactures and not be tempted to succumb to inducements offered by foreign firms after the war. We were quite capable of holding our own against German and Austrian chemists. All the more important advances in fundamental principles had been made by the British and the French, though the Germans had made good use of the discoveries of other countries by their powers of organisation which, in some respects, should be imitated by us in the future. He thought that the idea of preparing a register of manufacturers of materials and plant should be carried out, as he felt sure it would supply very useful information.

Mr. A. Chaston Chapman in seconding the resolution said that the report referred to some exceptionally important matters and was in some respects one of the most interesting which had ever been issued by the Council. If it had contained only a record of matters arising out of the war, including the question of the production of glassware and other laboratory requirements, it would have afforded evidence of a very considerable amount of work. The Council had, however, dealt with a good many other subjects, and he felt that the members were very greatly indebted to them for their valuable services during the past year.

Mr. Arthur W. Knapp and Mr. R. G. Grimwood were appointed scrutineers to examine the voting papers for the election of Officers and Members of Council, and to report the result of the ballot for the election of Censors.

Mr. Herbert F. Stephenson and Lieut. Edward F. Harrison were appointed Honorary Auditors, and the vacancy caused by the retirement of Dr. Percy E. Spielmann was filled by the appointment of Mr. George Cecil Jones.

The President having delivered his address (see p. 15), it was moved by Dr. M. O. Forster, seconded by Dr. Alexander Scott, and resolved: "That the thanks of the Fellows and Associates be accorded to the President for his Address, and that he be asked to allow it to be printed in the Proceedings of the Institute."

Dr. M. O. Forster said that the gratitude of Members was due to the President for delivering an address of such interest at a time when more urgent duties made so strong a claim. One of the respects in which it was remarkable lay in an absence of the castigation which it has become fashionable to inflict on chemical manufacturers for their past negligence and on the general public for their present apathy, and he hoped that was because Sir James could now take the view that the need for these admonitions was passing away. He was glad that attention had been drawn in the address to the vital necessity of holding a more even balance in the schools and universities between classical and scientific education; reform in this direction was long overdue, and although he did not go with those extremists who seemed to advocate the total displacement of classics by experimental study—that, indeed, would not be practicable for many years to come, even if it were desirable—he did claim that equal opportunities of mental development and academic reward should be offered in both branches of knowledge. In common with other old students of the late Professor Meldola, he warmly appreciated the reference which had been made to the great gifts and unostentatious achieve-

ments of their late President, the loss of whom at this time was particularly grievous. In conclusion, he endorsed most cordially the proposal that some attempt should be made by the Institute, in friendly conference and by peaceful arrangement with the Pharmaceutical Society, to adjust the long-standing hardship in connection with the namelessness of chemists as professional men. In another place he had expressed the view, which he now reiterated, that at a time when every class of the community was being called upon to make sacrifices for the common welfare, and was responding so generously to the call, it would not be unreasonable to invite pharmacists, for whose training, work and character he had nothing but respect and appreciation, to relinquish one of the three names which they enjoyed—chemist, druggist and pharmacist—and hand it over as a free gift to the poor, nameless people who, in so far as they spent their lives in studying chemistry and widening its boundaries, were surely entitled to call themselves chemists.

Dr. Alexander Scott, in seconding the vote of thanks, said that he was afraid that the President had taken too rosy a view of the attitude of the older universities towards science. They would require to do much more to show a proper appreciation of science and to give the necessary lead to the schools. He criticised the manner in which Fellowships at Cambridge were conferred. He hoped that manufacturers would soon realise the necessity of employing a greater number of chemists trained in the latest methods of research, and so enable industrial chemistry to progress; but in order to obtain really good men it was essential to hold out inducements and prospects sufficient to attract them.

The following were elected Censors: Dr. George Beilby, Prof. Percy F. Frankland, Mr. David Howard, and Mr. E. W. Voelcker.

The Officers and Council for the year ending March 1st, 1917, were declared elected (p. 3).

On the motion of Mr. Bertram Blount, seconded by Mr. Walter F. Reid, a vote of thanks was accorded to the retiring Officers and Members of Council for their services.

Mr. Blount expressed the hope that the Institute would endeavour to procure more general recognition of the distinction between the pharmacist and the chemist.

Mr. Walter F. Reid expressed his appreciation of the work of the Council during the year.

Mr. E. W. Voelcker, one of the retiring Vice-Presidents, in responding, said that it had been a great pleasure to him to serve under Professor Meldola and the present President, and he would assure the Members that he would maintain his interest in the affairs of the Institute.

The President declared the meeting dissolved.

The President's Address :

SIR JAMES J. DOBBIE, LL.D., D.Sc., F.R.S.

MARCH 1st, 1916.

MY first duty this afternoon must be to thank you for the honour which you conferred upon me at our last Annual General Meeting by electing me as your President.

When I consider the list of distinguished men who have preceded me in the Chair, and the extent and importance of the work accomplished during their respective periods of office, I am conscious that the task I have undertaken is one of no ordinary difficulty if the tradition which they have created is not to suffer in my hands. I can only express the hope that, with a continuance of the support which has been so loyally accorded to me during the past twelve months, my term of office may not be altogether barren of useful results.

We hold our General Meeting for the second time under the shadow of the great war, and although the history of the Institute during the past year has been marked by exceptional activity in some directions, our normal work, in common with that of all other scientific societies, has inevitably suffered from the circumstances of the times. Before, however, proceeding to comment on the work of the past year, it is my melancholy duty to notice the losses which we have suffered since we last met. They have, I regret to say, been unusually severe.

Professor Meldola's death has removed from our midst one who could ill be spared at the present time. His eminence as a man of science ; his experience of business ; his boundless

energy ; and his ripe judgment fitted him in no ordinary degree to bear an important part in the measures recently undertaken for the development of the chemical industries of the country. He was invited to join the various committees set up by Government in this connection, and cheerfully responded to all the calls made upon him. It is to be feared that his zeal for the public service hastened his end by leading him to take upon himself a burden beyond his strength. His services to the Institute, which are still fresh in your recollection, were many and great, and his interest in all that concerned it remained unabated to the day of his death. In spite of ill-health and the heavy demands made upon his time by the numerous public engagements which crowded the last months of his life, he seldom allowed a week to pass without calling at the Institute to keep himself in touch with its work. His memory will be long cherished by us for the earnestness with which he sought to promote the interests of our profession, for his loyalty as a colleague, and for the courtesy and dignity with which he presided over our meetings. A further proof of his solicitude for the welfare of the Institute is afforded by the provision in his will, under which a sum of £500 will eventually accrue to its funds. As a man of science the breadth of his sympathies and interests was his most notable characteristic. He enjoyed the distinction of being called not only to the Presidency of the principal chemical societies, but to that of the Entomological Society. It is rare in these days for anyone to attempt to master two branches of science so widely different ; it is still rarer for those who make the attempt to succeed in achieving distinction in both. Yet at the meeting of the Maccabeans held to honour his memory, it must have been difficult for those who were strangers to his career to decide, after listening to the addresses delivered on the occasion, whether biology or chemistry had suffered the greater loss by his death.

The names of other men of mark in their respective spheres of work appear in the death-roll of the year : J. J. Beringer, teacher of metallurgy and author of a well-known text-book

on the subject ; Eustace Carey, a leader in chemical technology ; Russell Forbes Carpenter, for many years Chief Inspector under the Alkali Works Act ; Sir A. H. Church, formerly Professor of Chemistry at the Royal Academy of Arts, and a prolific writer on scientific and artistic subjects ; Professor Vivian B. Lewes, of the Royal Naval College, well known for his investigations into the nature of flame ; D. A. Louis, mining engineer and metallurgist ; Dr. S. G. Rawson, Principal of the Battersea Polytechnic ; Dr. E. C. Seaton, Medical Officer of Health for the county of Surrey ; and Dr. W. J. Sell, University Lecturer at Cambridge. This, unfortunately, does not complete the list. As you are aware, a large number of our members are now serving with the colours, and it is with sorrow I have to record that eight of them have already sealed their patriotism with their lives. Their names will always be held in honour in this place.

One other name I must mention, that of Sir Henry Roscoe, who, although not a member of the Institute at the time of his death, was intimately associated with its early history. Apart from his work as a teacher and investigator he rendered inestimable service to the cause of scientific and technical education, and it is fitting that we should give expression to our sense of the loss which the country has sustained through his death.

Our financial position during the last eighteen months has been one of some little difficulty. The war found us in the midst of building operations, the cost of which was not entirely provided for by the special building fund. We had also to face a considerable addition to our maintenance expenditure on removal to the new building, and at the same time a diminution in our receipts caused mainly by a falling off in the number of candidates for admission to our examinations. Under these circumstances it is a matter for congratulation that our capital account is in such a satisfactory condition. Without troubling you with details, which will be found in the financial statement circulated with the Report of the Council, our position broadly

is that, leaving our new building and its equipment out of the reckoning, our assets at the present time exceed our liabilities by at least £7,000. It is true that there is likely to be some difficulty in keeping our expenditure within our income while the war lasts, but the estimated deficiency is not serious and gives rise to no anxiety.

Our warmest thanks are due to the Hon. Treasurer and to the Finance Committee for the unremitting care and attention which they have bestowed on the affairs of the Institute throughout the year.

After considerable delay, due, in the first instance, to a trade dispute, and later to the shortage of labour which followed the outbreak of war, the new building in which we are met to-day is now practically complete. Some minor appointments remain to be supplied, but we are in full occupation of the premises and may congratulate ourselves on the accomplishment of a long cherished scheme. These beautiful rooms provide us with headquarters of which we may well feel proud, and I cannot doubt that they will have an important influence on the future development of the Institute and fully justify the expenditure of time, labour, and money which their acquisition has cost.

The Building Fund, I may remind you, is not yet closed. The sum still required is, however, not large, and we believe there will be little difficulty in raising it in happier times. Amongst the contributions received in the course of the year was one from Messrs. Wood Bros. Glass Co., Ltd., of Barnsley, who desired in this practical way to mark their appreciation of the work of the Glass Research Committee. This graceful act is a great encouragement to the Committee, and I have thought it right to draw special attention to it, but I do not need to remind you that it is only one of many contributions from business firms which have been accompanied by expressions of warm interest in the work of the Institute.

The Building Committee have now finished their work, and I know I am only anticipating your wishes when I venture to

express, on your behalf, our gratitude to them for the thorough manner in which they have carried out their duties. Having regard to the special character of the building, their task was one of no little difficulty and demanded for its successful achievement the assistance, on the one hand, of men who thoroughly understood our requirements, and, on the other, of an architect quick to appreciate and to interpret the many technical details involved. We were fortunate in having both at our command. My predecessor, in his address last year, paid the architect a well-merited tribute for his part in the work, and I am glad to have the opportunity of endorsing what he then said. Sir John Burnet has given us a building which is as well adapted to our purposes internally, as it is externally in harmony with the dignified surroundings of its historic position.

It is pleasant to be able to record that notwithstanding the trying conditions of the times the erection of the building, which occupied nearly two years, was carried through with an entire absence of friction, and was marked by loyal co-operation with the architect on the part of all concerned—contractors, sub-contractors, and advisory experts.

The supervision of the domestic arrangements and of the furnishing of the new building has thrown additional work on Mr. Bevan and his colleagues of the House Committee. The air of comfort which pervades our meeting rooms bears witness to the success of their efforts on our behalf for which we owe them our warmest thanks.

The account of the work of the Public Appointments Committee, which will be found in the Report of the Council, shows that wherever they considered that the interests of the public or of the profession demanded their interposition the Committee have not failed to take such action as was open to them. Although they may not have succeeded in every case in gaining complete acceptance for their views, their representations have never failed to serve a useful purpose.

Chemists have been very much in request during the past year both for Government departments and for industries, and in this connection the Institute has been able to render very valuable service by means of its Registers. The Appointments Register is intended primarily for the use of our members, but since the outbreak of war it has been freely placed at the disposal of chemists from allied countries who are temporarily resident here, and through its medium a considerable number of such chemists have been able to obtain suitable employment. In many cases also substitutes have been found for men who are with the colours, or who have abandoned or interrupted their usual occupation to help in Government work. By means of a special register maintained to assist in meeting the demand for chemists required for the production of munitions and other war material, the authorities have been supplied with the particulars of more than 600 Members of the Institute, Graduates and Students. In this matter, as in all matters where the interests of the Institute are concerned, our indefatigable Registrar has interpreted his duties in a very generous spirit, and has been unwearied in his efforts to provide the Government authorities and controlled firms with the assistance they require. The time has not yet arrived for a full relation of the many activities of the Institute during the present crisis. Possibly even when peace is restored much will remain a closed book, but you may be assured that the Institute has fulfilled a useful function and one which has been fully appreciated by the authorities.

The action of the Institute in the matter of laboratory requirements has met with a very gratifying measure of success. Following the publication of the List of Reagents for Analytical Purposes by the Joint Committee of the Institute and the Society of Public Analysts, several firms undertook the production of the more important reagents. Although many obstacles had to be overcome I understand that, so far as all ordinary reagents are concerned, continuous supplies of the requisite degree of purity are now assured. It is satisfactory

also to be able to state that filter paper and laboratory porcelain, for which formerly we were entirely dependent on foreign sources of supply, are now being manufactured in this country.

You will recollect that the question of laboratory glassware was forced upon our attention immediately after the outbreak of war by the difficulty which chemists experienced in renewing their stocks of apparatus. With a view to rendering such assistance as was possible in the emergency the Council appointed a special committee, under the chairmanship of Professor Meldola, to inquire into the matter. It was intended originally to confine the scope of the inquiry to laboratory glass, but as the existence of the Committee became known, other problems, some of great urgency from the public point of view, were submitted to them, and in this way the work has been extended far beyond the limits originally proposed. Glass for miners' lamps, for pharmaceutical ampoules, for X-ray bulbs, and for many other special purposes, as well as glass for optical instruments, has in turn engaged the attention of the Committee. Research by Committee is not an expedient which leads as a rule to quick results, nevertheless the Glass Research Committee were in a position to publish no less than eleven formulas within six months after they commenced their operations. The credit for this remarkable achievement is due to Professor Herbert Jackson, who has thrown himself into the work with an energy and enthusiasm which have overcome all obstacles. In the laborious investigations involved in arriving at his formulas and in the examination of the glasses produced he has been ably assisted by Mr. Thomas R. Merton. Thanks to the cordial co-operation of various well-known firms of glass makers, most of Professor Jackson's formulas have already been tested on the manufacturing scale with complete success. So far as laboratory glass is concerned, I do not think I am going beyond what the facts warrant when I say that in future an adequate and wholly satisfactory supply of all ordinary apparatus will be procurable from British manufacturers.

It is agreed on all hands that we must henceforth be independent of foreign sources of supply for a material so indispensable to our work as glass. The realisation of this aim rests entirely with ourselves and depends on the measure of support we are prepared to give to home manufacturers. I ask all members of the Institute, therefore, to use British made glass and only British made glass. If at first it does not come up to your expectations in all respects, do not turn immediately to other sources of supply, but let the Institute or the manufacturer know in what respects it is defective in order that steps may be taken to remedy the defect. It is not suggested that you should be satisfied with an inferior article. What is asked of you is the exercise of a little patience until our manufacturers have completely mastered the technique involved in the production of articles new in their experience.

I make this appeal without hesitation. Whatever may be our views on the larger questions of trade policy, there can be but one opinion as to what our policy should be where those industries which it is the present fashion to speak of as "key" industries are concerned. If we ever again allow ourselves to become dependent upon foreign sources of supply for materials, the want of which might bring the vital industries of the country to a standstill, we shall be courting the fate which will assuredly overtake us.

The value of the work of the Glass Research Committee has been recognised by the Advisory Council on Scientific and Industrial Research. Sir William McCormick, the Chairman of the Council, accompanied by Dr. H. F. Heath and Mr. S. H. Wood, the Assistant Secretary, visited the Institute last November for the purpose of informing themselves at first hand as to our work. Soon afterwards we received the gratifying intimation that the Council had recommended that a substantial grant should be made to the Institute to enable it to extend its investigations to other varieties of glass required for scientific purposes and to certain optical glasses for industrial purposes. You will be pleased to know that Dr.

Beilby, our past President, whose great interest in all matters affecting the application of science to industry is well known to you, has accepted appointment as Chairman of the Glass Research Committee in succession to Professor Meldola.

The aid afforded to Government departments, the measures taken to ensure continuous supplies of pure reagents of home manufacture for our laboratories, and the work of the Glass Research Committee are the special contributions of the Institute to the exigencies of the times. Such activities, however, lie outside our ordinary sphere of work, and we have to ask ourselves whether also in respect of those duties which more particularly belong to us as an Institute we are doing everything that the circumstances of the times demand. The whole country has been roused by the war to a sense of the danger to which our industries have been exposed through the competition of a crafty and unscrupulous enemy, and to the necessity for taking adequate measures to cope with this danger in the future by equipping ourselves for the economic struggle which will ensue when peace is restored.

The discussions which have taken place on this subject reveal a wide divergence of view both as to the causes of the unsatisfactory position in which we find ourselves and as to the steps required to remedy it. As regards the chemical industries, however, it is generally agreed that whatever other conditions may be necessary to the continued prosperity of those industries which we already possess, or to the successful establishment of those which we hope to possess, it is essential that the relations between chemical science and chemical manufactures should be more intimate in the future than they have been in the past. This is the burden of all that has been spoken and written on the subject in the course of the last eighteen months. It is obvious, however, that the condition can only be fulfilled if the country possesses an ample supply of highly-trained professional chemists. On this point I should like to quote to you a passage from a paper which Dr. Beilby recently read before the Society of Chemical Industry:—

“ I must repeat,” he says, “ the statement of my belief that the phenomenal development of chemical industry in Germany has resulted much more from the large command of chemists and engineers of sound professional training than from the possession of an even larger supply of research chemists of mediocre ability.”

I need hardly add that although this passage, taken from its context, might perhaps give the impression that Dr. Beilby underrates the value of research, quite the reverse is the case.

Now, so far as a supply of chemists of sound professional training is concerned, we can, I think, face the future with some confidence.

At a time within my own memory the University laboratories could be counted on one's fingers, technical colleges were represented by a few imperfectly equipped mechanics institutes and polytechnics, and scientific education in the schools was unknown. Now all this is changed and opportunities for obtaining a training in chemistry exist everywhere. Universities and university colleges have sprung up all over the country, each possessing a chemistry department which in point of view of equipment and the reputation of its staff is, in not a few cases, at least on as high a level as the most celebrated of the continental schools ; technical colleges, provided with excellent laboratories, are to be found in every industrial centre of importance ; and in many of the secondary schools the provision for the teaching of chemistry is hardly inferior to that of the colleges in its completeness. Our Registrar, in an interesting and useful article which he contributed recently to the press, mentioned that in 1912 the universities and technical schools and colleges numbered nearly 300, and that at that date chemistry was being taught in nearly 600 public and secondary schools. It must, however, be admitted that in respect of one section of our educational system the position is unsatisfactory. The great public schools are for the most part unsympathetic towards the study of science, and even when they are excellently equipped for the purpose their results are meagre and unsatisfactory. The same charge could, at all

events until recently, be brought with justice against the old universities, but the master of Christ's College has recently made an effective reply so far as the Cambridge of the present day is concerned. It must, I think, be allowed that that great University has shown extraordinary energy and has achieved an extraordinary measure of success in adapting its teaching to the needs of modern times. Not only has it established schools of world-wide renown in the pure sciences, but it now claims a foremost place in the applied sciences of engineering and agriculture. If Oxford still slumbers under the spell of "the last enchantments of the Middle Ages," the stirrings of a new life are discernible even in her. That she is rousing herself to meet her responsibilities in the present crisis is shown by the terms of a memorandum just issued by the Natural Sciences Board in support of a reform in the regulations for the honours degree in chemistry whereby research would become a compulsory part of the curriculum. It is surely of good augury too for the future outlook of chemistry at Oxford, and for the relations of science to industry, that Oxford should have taken to herself the distinguished son of the discoverer of the coal-tar colours, and that through him she links herself with the national movement for the revival of the industry in this country.

We are so given over to self-depreciation that we are apt to overlook the great progress that has already been made towards placing science education on a satisfactory footing. To dwell upon it with complacency at the present time would perhaps be a mistake. Much still remains to be done, but I am convinced that it will be best and most speedily done by proceeding on the lines which experience has already shown are capable of leading to the desired result. We may learn from the example of Cambridge how to reconcile the old with the new and bring our ancient foundations into line with modern requirements without sacrifice of the characteristics which still appeal so powerfully to Englishmen. The reforms have been successful because they have been wrought from within by men who, while in the foremost ranks of modern science, are

nevertheless in sympathy with the traditions of the old universities. I believe that similar methods would succeed with the public schools if only the headmasters and governing bodies could be brought to realise the necessity for a far-reaching modification of their curricula to meet the requirements of the present day. Should they fail to answer the expectation of the country the inevitable result will be that schools established on more modern lines will gradually replace the old public schools as the training ground of the leaders of the nation. A more general diffusion of the knowledge of scientific method and of scientific facts has become one of the necessities of our national existence, and the need must be met if we are to continue to hold our place in the world. But it appears to me that the demand which is sometimes put forward that science must henceforth be the dominant factor in education confuses the real issue and needlessly arouses opposition to the reforms which are essential. Surely what is wanted is not education in which science or any other subject is predominant, but education which embraces all the elements that are necessary for stimulating and developing the various faculties of the mind. Such an education must include science—not a smattering, but a training as thorough and as continuous as that now devoted to linguistic studies—and education on these lines should be continued until the proper age for specialisation arrives. By that time the natural bent of the pupil will have asserted itself and, if no extraneous inducements are held out to him to choose one side of the school rather than the other, it may safely be predicted that at least as many will choose the scientific as the classical side. In any case, all will have received the elements of a scientific education as well as of a classical education. The great defect of our public school education at present is that it specialises in classics from the beginning and other subjects never get a fair chance.

But the question with which we are more immediately concerned is the position of the Institute in relation to scientific and more especially chemical education. Two duties are specifically assigned to the Institute under its Charter, viz.,

the training, and attesting the qualifications, of persons proposing to practice in analytical or to advise in technological chemistry. Although thus empowered by its Charter to undertake the training of chemists, the Institute has wisely left this duty to the schools and colleges. But by requiring its students to obtain their training at institutions specially approved for the purpose, and by the standard and character of its examinations, it has been able to exercise an important influence over the equipment and curricula of such institutions. The privilege of training for the Institute is one which is highly valued, especially by the technical schools and colleges, but hitherto the Council have granted it with a very sparing hand. At the present time the number of approved institutions does not exceed thirty-five. This is a very small proportion of the 300 universities and colleges referred to by Mr. Pilcher and, in my opinion, it is very desirable that it should be increased. I should like to see a more active and a more liberal policy pursued in this matter. It is of the greatest importance to the country at the present time that the means of obtaining a sound education in chemistry should be brought within the reach of everyone. The schools already exist perhaps in sufficient number. Many of them, besides those on our list of approved institutions, no doubt possess an equipment equal to our requirements, but some do not, and I believe we shall be doing a real public service if we can offer them encouragement to raise their standard to the level which would justify us in granting them recognition. In considering the claims of an institution to be placed on the list of those recognised for the training of candidates for the Associateship, the Council are guided by the qualifications of the staff, the scope and character of the day courses of instruction, the equipment of the laboratories, and the constitution and general status of the institution. Provided a student from one of these institutions secures the degree of B.Sc. in the requisite subjects, he is admissible to our examinations. It would appear reasonable, therefore, to include in our recognised list any institution which is capable of training students to take that degree. I would

ask for the consideration of this whole subject on broad general grounds as one of the matters lying within the scope of the ordinary work of the Institute to which we may with advantage direct our particular attention in the present circumstances.

Besides providing adequate opportunities for training the chemist it is necessary also to provide some means of ascertaining whether his training has been such as to fit him for professional work. Attesting the qualifications is the second of the duties imposed upon us by our Charter and also demands our special attention at this juncture. Every university and college has its own examinations on the results of which it grants degrees or diplomas to those who reach a certain standard of proficiency. However, as everyone knows who has had experience of graduates in science drawn from different universities, the standards of the degrees and diplomas vary within wide limits. The letters B.Sc., or M.Sc., or D.Sc. in chemistry of the different universities tell us little as to the attainments of their respective graduates, unless we happen to possess special knowledge of the regulations and standards of the particular universities in question. The variation in these qualifications is too great to allow of their serving the purpose of certificates of professional competency. In certain cases they may imply a standard in some respects in excess of the most exacting requirements; in other cases they fall below the lowest standard that could be regarded as satisfactory. This is one of the consequences of the liberty which our universities enjoy, and no wise man would wish to fetter that liberty merely for the sake of procuring uniformity in such matters. At the same time this want of system has its disadvantages. A qualification which varies both in character and standard according to the source from which it is derived does not afford satisfactory guidance to a public anxious to obtain evidence of professional competency. The Institute was established to supply this want, and in so far as the standards which it has set up are concerned I think it must be admitted that it has supplied it successfully. But in one respect it has not yet fully realised the aim of its founders. It

has not succeeded in bringing within its fold a large number of chemists whose qualifications reach the standard which it has set up for its members.

There is, and always will be, a demand for chemical services, both in laboratories and in works, such as can be rendered by men possessed of little or no knowledge of the science of chemistry, and whose qualifications, whatever they may be, do not come into comparison with those of our members. Thus a large body of men engaged in chemical operations will always remain outside the Institute. Such men will continue to be called chemists, for it is vain to hope that the name can ever be restricted to the members of this or any other body. But the fact that chemists whose qualifications are on quite a different plane from those of our Fellows and Associates are outside the Institute is of little consequence. What does matter, and must constitute a permanent source of weakness, not to the Institute merely, but to the profession as a whole, is that highly qualified chemists also remain outside the Institute. Our policy, therefore, should be one of comprehension, not of exclusion. In this policy I am convinced the true interests of the Institute are bound up. The Institute does not exist merely for the purpose of attesting professional qualifications. One of its main objects is to weld together the members of the profession into a corporate whole, so that they may be able to exert collectively on public opinion an influence commensurate with the importance of the great interests which they represent. But this aim is impossible of full realisation unless the Institute can speak for the profession as a whole.

The conclusion which I draw from the foregoing considerations is that we ought to endeavour by every means in our power to secure the adhesion to the Institute of all chemists whose qualifications are up to the level of our standard. I do not propose on this occasion to refer further to the position of those who have finished their training and passed into the working ranks of the profession without becoming members of the Institute. The case of those who are entering on their period of training is the more urgent one. How does it stand

with them? A young man who takes up chemistry with a view to making it his profession, as a rule enters one of the universities or one of the technical colleges. In either case the science degree of a university is the goal usually set before him. If his professor happens to be interested in the work of the Institute he may point out that the preparation for the degree may be made to cover the same ground as preparation for the qualification of the Institute, and he may encourage the student to aim at both. Except when such personal influences are at work there is nothing to make the student aware of the fact that by judicious arrangement of his studies he may acquire a valuable professional as well as an academic qualification; or, on the other hand, that by neglecting to secure the Institute qualification he is excluding himself permanently from certain spheres of work which are practically confined to members of the Institute. If, however, a closer tie united the universities with the Institute, the universities would not fail to make all the facts relating to the Institute qualifications known to their students, just as they do in the case of other professions. It would clearly be to their interest to do so, for there can be little doubt that, popular as the science degree in chemistry now is in most universities, it would be sought after still more eagerly if it paved the way directly to a professional career. As matters stand at present a large number of such graduates never become members of the Institute. The reason is obvious. Having passed their university examinations they are naturally unwilling to face another ordeal of a similar kind in order to gain a qualification of the value and significance of which they are either entirely ignorant or very imperfectly informed. With this attitude those who have had much experience of examinations cannot fail to sympathise. I do not share the view that all examinations are an evil, but I believe that the unnecessary multiplication of examinations is an unmitigated evil. When a man has reached a certain standard of attainments and has obtained a certificate to that effect from a competent body of undoubted authority, the certificate should be accepted for all purposes for

which a higher standard is not required. Examination work is unproductive work, and it is our bounden duty in these times to get rid of unproductive work wherever we can. It is to be remembered in this connection that the Institute is primarily an attesting body, rather than an examining body, and that it is not essential for the due discharge of its functions that it should itself in every case also be the examining body.

For the purposes of the Institute qualification we require a candidate to give evidence that he has obtained a good general education, that he has attained a standard of proficiency in general chemistry and allied sciences, and in one or other of the special branches of chemistry which are included in the Institute's scheme.

Now, all chemists, whatever the special line to which they devote themselves, must, up to a certain point, go through the same course of training, and in so far as the results of this training are adequately tested by the examinations of the particular institution in which it is received, they ought, in my view, to be accepted as sufficient for the purposes of the Institute. This principle is already recognised to a limited extent by the exemption granted to honours graduates from our Intermediate Examination. The arrangement is good so far as it goes, but it does not go far enough, inasmuch as it leaves the graduate outside the Institute until he has passed a further and more highly specialised examination held by the Institute itself.

As you are aware, the Council have had under consideration for some time past an alteration of the regulations for admission to the Institute which would allow of the assessment of the qualifications of a candidate for the Associateship concurrently with his examination for an honours degree. The new regulations proposed would, I believe, to a great extent effect the object for which I have been contending, whilst absolutely safeguarding the standard of the Institute qualifications.

A final decision with regard to the alteration of the regulations is postponed until after the war, as it is deemed inexpedient to proceed further in the matter while so many of our Fellows

and Associates are absent from the country on military duty. It is, however, important that the question should not be lost sight of in the meantime, and for this reason I have felt justified in directing your attention to it again at some length this afternoon.

In the coming session I propose to ask the Council to take certain steps to promote the more complete organisation of the profession for the needs of the community, and I may say that some suggestions to that end are already under my consideration, having in view the industrial activity for which this country must be fully prepared at the termination of hostilities.

I should like to add just one word regarding the relations of chemists to the public. We have heard a great deal lately about ignorance on the part of the public as to the work and status of the chemist, and untoward incidents have occurred which have ruffled our feelings and hurt our self-respect as members of a profession which certainly deserves well of the country, especially at the present time. But we must remember that ours is a comparatively young profession which is only gradually establishing itself in the knowledge and, let us hope, the good opinion of the community. It will be successful in this in proportion as it attracts men of strong character and individuality, efficient and capable of holding their own as professional men. As it gains in strength, its services will become generally recognised and will meet with the same appreciation as is accorded to those of the older learned professions.

No doubt, also, the fact that the name "chemist" has long been closely identified in this country, alone, I believe, of all the European countries, with an ancient and honourable craft in which chemistry finds application, is responsible for much of the confusion that exists in the public mind on the subject. But the war is proving a powerful, if stern, educator and the public are learning so many things at present about the work

of the chemist that I do not despair of seeing the day when it will be a matter of common knowledge that while all pharmacists are chemists all chemists are not pharmacists.

With the end of the official year we lose for the time being the services of several of our colleagues as members of the Council.

On this occasion the two retiring Vice-Presidents are Mr. E. W. Voelcker and Sir Boverton Redwood. No member of the Institute has taken a keener or more sustained interest in our work than Mr. Voelcker. As Chairman of the Proceedings Committee he has bestowed unusual care on the editing of our publications, and in addition to the work which ordinarily devolves upon the Chairman of that Committee I may remind you that he gave very valuable help in supervising the production of the History of the Institute which was published the year before last. To Sir Boverton Redwood we are specially indebted for his interest and help in the early stages of our inquiries into the production of laboratory supplies. The other members of the Council who are retiring at this time have all rendered valuable service to the Institute, and have shown throughout the whole period of their tenure of office a keen interest in its affairs. To them and to all other members of the Council and its Committees, and to our Registrar, I desire to express my warmest acknowledgments for the support which they have so freely accorded me throughout the past year.

Proceedings of the Council.

FEBRUARY—MARCH, 1916.

Appointment of Committees.—The Council elected at the Annual General Meeting held their first meeting on March 10th, and appointed the Standing and Special Committees with their respective Chairmen (pp. 5-7).

Vacancy on the Council.—Dr. Gilbert J. Fowler having been obliged, owing to his appointment as Professor of Applied Chemistry in the Indian Institute of Science, Bangalore, to resign his seat on the Council, the vacancy thus caused has been filled by the election of Professor Arthur Lapworth, F.R.S.

Appointment of Examiners.—The Council have reappointed the Board of Examiners for the year ending March 1st, 1917.

Glass Research.—The Glass Research Committee are now able to report that Professor Jackson has succeeded in arriving at formulas for fluor crown, prism crown, and heavy flint—optical glasses in request at the present time. The formulas will be communicated, under arrangements made with the Board of Trade, to firms who intend to undertake the production of optical glasses. Formulas for other kinds of optical glass and for two glasses of an entirely new character, but of distinct promise for optical work, will probably be available in the near future.

Professor Jackson has received a letter from the Rt. Hon. Walter Runciman, President of the Board of Trade, expressing the appreciation of that Department for the services rendered by him to the glass industry, particularly in connection with the production of laboratory glassware. Professor Jackson, in thanking Mr. Runciman for his letter, has acknowledged the co-operation of the Glass Research Committee of the Institute, especially of his colleague, Mr. Merton, and has referred to the cordial support of the manufacturers with whom the Committee have been in close

association and to whom so much credit is due for their enterprise in translating the laboratory experiments into industrial processes.

Unauthorised Use of F.I.C.—The attention of the Council has lately been directed to the use of the initials "F.I.C." by an individual who is not and never has been in any way connected with the Institute. He has produced a printed certificate, headed "Royal Institute of Chemists, London, 1913," and certifying that he "has a thorough knowledge of general chemistry—organic and inorganic, quantitative analysis and all sections of analytical chemistry, thereby qualifying him as a degreed Fellow of the above Institute." The certificate is signed by a Chairman, the holder of the certificate, and a Superintendent, and dated August, 1913. The signatures of the Chairman and Superintendent are not entirely decipherable. Any Member or Student of the Institute who has information regarding the "Royal Institute of Chemists" is requested to communicate with the Registrar.

Exemption from Enlistment of Analytical, Consulting or Research Chemists.—In order to clear up any misunderstanding that may arise in consequence of recent legislation concerning reserved occupations, the Royal Society desire to point out that any unmarried chemist of military age entitled to exemption as an analytical, consulting or research chemist should, unless attested before March 2nd, lodge a claim for exemption with the Local Tribunal before that date.

Men who have attested should lodge their claim for exemption with the recruiting officer or Local Tribunal when called up for enlistment, and, if such claim be not admitted, a communication stating all material facts in favour of the claim should at once be addressed to the Secretaries of the Royal Society, Burlington House, Piccadilly, London, W.

Examinations.—Intermediate and Final Examinations will be held in London and Dublin in July. Candidates desirous of presenting themselves are requested to communicate with the Registrar.

Obituary.

RAPHAEL MELDOLA died at Brunswick Square, London, on November 16th, 1915, in his sixty-seventh year. Born in the Essex Road, Islington, he was educated at private schools and received his early scientific training at the Royal School of Mines, London, and after working for a while in the private laboratory of Dr. John Stenhouse, entered the colour factory of Messrs. Williams, Thomas & Dower, at Brentford. Two years later, in 1872, he was appointed to the teaching staff at the Royal College of Science, London, where he was also private research assistant to Professor Edward Frankland. Subsequently he assisted Professor Lockyer in the Solar Physics Laboratory at the College, gaining experience in astronomical and spectroscopic work, and, in 1875, conducted and wrote the report on the British Eclipse Expedition to the Nicobar Islands. On his return he was appointed chemist at the colour works of Messrs. Brooke, Simpson & Spiller, at Hackney Wick, where he remained eight years and made a number of important practical discoveries, including Meldola blue. In 1885 he was appointed Professor of Chemistry at the Finsbury Technical College, London, which position he held when he died. In 1882-3 he translated and edited Weissmann's "Studies in the Theory of Descent"; in 1891, produced "The Chemistry of Photography," and "Coal and what we get from it"; and in 1904, "The Chemical Synthesis of Vital Products." He was President of the Essex Field Club, 1880-3 and 1901-2, the Entomological Society, 1895-7, the Chemical Society, 1905-7, the Society of Dyers and Colourists, 1907-8, and the Society of Chemical Industry, 1908-9. He became a Fellow of the Royal Society in 1886, received the Davy Medal in 1913, and was serving as a Vice-President at the time of his death. In 1910 he was Herbert Spencer Lecturer at Oxford University from which he received the honorary degree of D.Sc. He attended the St. Andrews University Quinquenary Celebration in 1911 as the representative of the Institute and received on that occasion the Degree of LL.D. He was actively engaged in an honorary capacity in helping the Government from the outbreak of war and was appointed a Member of the Board of Trade Advisory Committee on Chemical Supplies, of the Advisory Council on Scientific and Industrial Research, and Chairman of the Advisory Council of British Dyes, Limited. He was elected a Fellow of the Institute in 1878, served on the Council, 1888-95, and 1896-9, as a Vice-President, 1909-12, and as President, 1912-15. After his retirement from the presidency, he continued to hold office as a Censor, and was Chairman of the Glass Research Committee. He was buried at the Jewish Cemetery, Golders Green. The Institute was represented at his funeral by the President and the Registrar. Under his will he bequeathed to the Institute a legacy of £500 subject to the life interest of his widow.

THOMAS McILVEAN PATERSON, a Registered Student of the Institute, entered the Glasgow and West of Scotland Technical College—now the Royal Technical College—Glasgow, in 1910. He died of wounds received in France on October 13th last while serving as a corporal in the Royal Engineers.

THOMAS LAW PATTERSON died at Greenock on May 7th last in his seventy-fourth year. He was educated at the Glasgow Academy, 1856–8, and in 1860 he entered the employ of Mr. H. Donaghy, chemical manufacturer, Glasgow. In 1865 he was appointed chemist at Mr. J. Poynter's works at Greenock, and, in 1868, chief chemist to Messrs. J. Walker & Co., sugar refiners, Greenock. He resigned this position in 1872, and entered into partnership with Mr. T. R. Ogilvie, subsequently returning to assume control of Messrs. Walker's new refinery, a position which he held for twenty-three years. He retired in 1897, to practise as a consulting chemical technologist and sugar specialist. During his career Mr. Patterson took out several patents relating to improvements in sugar refining, including centrifugals for steaming raw sugar and clarifying syrups and washings. He also conducted an important research on "The Carbonaceous Matter of Animal Charcoal," reading a paper with that title before the Scottish Section of the Society of Chemical Industry. He was elected a Fellow of the Institute in 1878.

KENNETH ROSS, a Registered Student of the Institute, was killed in action in France on September 25th last. He was educated at the Portora Royal School, Enniskillen, and at Eastman's Naval Academy, Winchester, receiving his scientific training at Queen's College, Belfast, which he entered in 1908. He graduated B.Sc. at Queen's University, Belfast. He was serving as a Second Lieutenant in the 4th Battalion of the Royal Irish Rifles at the time of his death.

VINCENT WILLIAM THEOBALDS died at Purley, Surrey, on February 13th, in his thirty-eighth year. He received his scientific training at the Finsbury Technical College, London, which he entered in 1896. In September, 1899, he obtained an appointment as works chemist in the laboratory of the Gas Light and Coke Co. at Silvertown, and, in 1903, as chief chemist at the varnish works of Messrs. Thos. Parsons & Sons, of Mitcham, Surrey. He was appointed works manager there in 1909, and was in control of the works at the time of his death. He passed the Final Examination for the Associateship in 1902, and was elected a Fellow of the Institute in 1905.

HAROLD VERNON was killed in France on January 1st, in his twenty-seventh year. Educated at the Priory School, Birmingham, he received his early scientific training at the Municipal Technical School, Birmingham, and graduated as B.Sc. (Lond.) in 1911. He passed the Final Examination and was elected an Associate of the Institute in 1914. Soon after the outbreak of war he joined the Artists Rifles, and at the time of his death was an observer in the Meteorological Section, Royal Engineers.

The Library.

Since the issue of the Proceedings for 1915, Part II., the Committee have had much pleasure in acknowledging the following gifts :

ATACK, F. W., M.Sc., A.I.C. :

The Chemist's Year Book, 1915. (2 Vols.) F. W. Atack. *Manchester*, 1915.

The Proprietors of the Journal of Biological Chemistry (per H. D. DAKIN, D.Sc., F.I.C., and A. N. RICHARDS) :

Journal of Biological Chemistry. Vols. XX.-XXIV. *Philadelphia*, 1915-16.

ENGINEERING STANDARDS COMMITTEE :

Eleventh Annual Report. *London*, 1915.

HOWARD, DAVID, F.I.C. :

Collected Researches of the National Physical Laboratory. Vols. IX.-XII. *London*, 1913-15.

SANDERSON, JOHN, F.I.C. :

A Number of English and American Scientific Journals.

MESSRS. SCOTT, GREENWOOD & SONS :

Glycerine : its Production, Uses and Examination. S. W. Koppe. *London*, 1915.

SPIELMANN, PERCY E., Ph.D., F.I.C. :

Organic Chemistry or the Chemistry of the Carbon Compounds. Victor von Richter. (Vol. I. Chemistry of the Aliphatic Series.) Translated by Percy E. Spielmann. *London*, 1915.

WHEELER, E. G. G., A.I.C. :

Lehrbuch der Anorganischen Chemie. Dr. A. F. Holleman. *Leipzig*, 1911.

Lehrbuch der Mineralogie. Dr. G. Tschermak. *Wien*, 1905.

Lehrbuch der Experimentalphysik. Dr. E. von Lommel. *Leipzig*, 1911.

Physikalisches Praktikum. E. Wiedemann und H. Ebert. *Braunschweig*, 1904.

Lehrbuch der Stereochemie. Dr. A. Werner. *Jena*, 1904.

WOOD, J. T., F.I.C. :

Das Entkalken und Beizen der Felle und Haute. J. T. Wood. *Braunschweig*, 1914.

The Puering, Bating and Drenching of Skins. J. T. Wood. *London*, 1912.

A number of pamphlets and reprints of papers have also been presented.

Books Purchased.

Methods in Chemical Analysis. F. A. Gooch. *New York*, 1912.

The Potash Salts. Translated from the German of L. A. Groth. Preface by S. Rideal. *London*, 1902.

Introduction to Modern Inorganic Chemistry. J. W. Mellor. *London*, 1914.

Mineral Industry during 1914. Edited by G. A. Roush. *New York*, 1915.

Journals, &c., Wanted.

The Library Committee will be greatly obliged by gifts of any of the following, which are needed to complete sets :—

<i>Publication.</i>	<i>Wanted.</i>
The Analyst	Vols. 3 and 4.
The Chemical News	Vol. 28 ; many numbers of 29 and 30.
The Chemical Trade Journal... ..	Vol. I ; many parts of Vols. 9-19 ; and No. 610.
Chemiker-Zeitung	Vols. 1-17, inclusive.
Chemisches Zentralblatt	The first four series, and Vols. 1-5, inclusive, of the 5th series.
Comptes Rendus	Prior to 1878, and since 1893.
Journal of the Board of Agriculture	Prior to April, 1905 (except Vol. 1, and parts 1 and 2 of Vol. 2).
Journal of the Institute of Brewing	1898 (Nos. for January and March) ; 1899 (Nos. for February and December).
Journal of the Royal Society of Arts	Many early volumes and parts before 1886.
Metallurgical and Chemical Engineering	Vols. 1-4 of The Metallographist, inclusive.
Nature	Vols. 35-37, inclusive ; many parts of 38 and 39, all 40, many parts of 41, 42-44, inclusive ; and 62-64, inclusive.
Proceedings of the Royal Society	Prior to Vol. 12 (1862), and since Vol. 24 (1876).
Zeitschrift für angewandte Chemie	All prior to 1898 ; and 1901.

The Library Committee look to the Fellows and Associates for the continuance of their generous support.

**FELLOWS, ASSOCIATES, STUDENTS AND
CANDIDATES FOR EXAMINATION WHO ARE SERV-
ING OR WHO HAVE SERVED WITH H.M. FORCES.
(SUPPLEMENTARY LIST.)**

*It is requested that any inaccuracy or omission be
reported immediately to the Registrar.*

A list of 320 names was published in Proceedings, Part I., 1916. The following additional names have been received :—

FELLOWS.

Birch, W. Colet, Sapper, Motor Cyclist Section, R.E., British East Africa.
Davidson, Alexander, 15th Battalion Argyll and Sutherland Highlanders.
Denney, E. J., Temp. Lieut. A.O.D.
Hayward, Eric, Calcutta Light Horse.
Pakes, W. C. C., Captain, 4th South African Field Ambulance.
Stevens, M. W., Temp. Lieut. A.O.D.

ASSOCIATES.

Browning, R. G., 2nd Lieut. R.E.
Clarke, A. L. R., 2nd Lieut. R.E.

STUDENTS.

Barclay, A., R.E.
Cohen, E. H., R.N.A.S.
Cousins, F. G., Corporal R.E. (D.C.M.).
Gibbs, G. Harcourt, 2nd Lieut. R.G.A.
Miller, C. J., Sussex Regiment.
Phillips, R. J., R.N.A.S.
Phillips, S. B., R.N.A.S.
Smith, F. W. H., R.N.A.S.
Taylor, A. J., Overseas Contingent.
Whitworth, C. W., R.N.A.S.
Wynn, W. O. R., Corporal R.E.

Since the publication of the list given in Proceedings, Part I., entries have been altered in the following cases :—

FELLOWS.

Bassett, F. L., Lieut. Royal West Kent Regiment.
Bridge, S. W., 2nd Lieut. 12th Battalion Royal Fusiliers.
Bruce, Robert, Lieut. R.E.
Ferre, C. E. C., Captain 1st City of London Sanitary Company, R.A.M.C.
(T.F.).

Goldsbrough, H. A., 2nd Lieut. R.E.
 Harrison, E. F., Major, Unattached List.
 Hill, J. R., Sergeant R.E.
 Kirkham, V. H., Captain, Unattached List, serving with the Forces in East Africa.
 Ladell, W. R. S., Temp. Lieut. A.O.D.
 Law, D. J., 2nd Lieut. R.E.
 Law, Robert, Lieut.-Colonel, Australian Engineers.
 McCombie, Hamilton, Captain, Chemical Adviser, First Army (Military Cross; Mentioned in Despatches).
 Monier-Williams, G. W., Major 12th (Reserve) Battalion County of London Regiment.
 Robison, R., Captain 1st London (City of London) Sanitary Company, R.A.M.C.
 Shepherd, E. H., 2nd Lieut. R.E.
 Stone, O. J., 2nd Lieut. R.F.A.

ASSOCIATES.

Bunker, S. W., Captain Royal Fusiliers, attached R.E.
 Georgi, C. D. V., 2nd Lieut. R.E.
 Kent-Jones, D. W., Sergeant R.E.
 Roos, C. B., Company Q.-M.-Sergeant R.E.
 Solomon, J. B., 2nd Battalion Oxford and Bucks Light Infantry, Staff Captain Royal Flying Corps.
 Walker, F. G. C., Captain R.E. (Military Cross).

STUDENTS.

Bishop, R. O., 2nd Lieut. (Ministry of Munitions).
 Bowyer, E. G., 2nd Lieut. 3rd/1st Battalion Cambridgeshire Regiment.
 Buttrick, H. P., 2nd Lieut. R.E.
 Cowlishaw, G. D., Corporal 12th (Service) Battalion York and Lancaster Regiment.
 Figg, E. F., Sergeant R.E.
 Gosney, H. W., 2nd Lieut. 7th Rifle Brigade.
 McLachlan, T., Corporal R.E.
 Mitchell, C. A. D., Lieut. 2nd/4th Battalion Devon Regiment.
 Murray, K. F. M., Lieut. attached 2nd/23rd Battalion, London Regiment.
 Stephens, H. C., 2nd Lieut. R.E.
 Ward, E. C., Lieut. A.S.C., Mechanical Transport, British Expeditionary Force.
 Wilson, D. M., Lieut. R. E. (Military Cross).

CANDIDATE FOR EXAMINATION.

Sewill, J. W., Lieut., Reserve of Officers, Army Cyclist Corps, seconded R.E.

The Register.

Since the publication of Proceedings, Part I., 1916, the Council have elected 7 Associates to the Fellowship, and 4 Students have been admitted. 4 Fellows have died.

Associates Elected to the Fellowship.

- Arbuthnot, Kenneth Charles Guthrie, B.A., B.Sc. (R.U.I), c/o Mrs. Roberts, 1, Market Square, Penrhyndendraeth.
- Crabtree, John Ickeringill, M.Sc. (Vict.), Research Laboratory, The Eastman Kodak Co., Kodak Park, Rochester, N.Y., U.S.A.
- Gemmell, Alexander, D.Sc. (Edin.), 4, Lindsay Place, Edinburgh.
- Rawling, Francis George, M.Sc. (Leeds), c/o The West Virginia Pulp and Paper Co., Piedmont, Virginia, U.S.A.
- Robinson, Frederic, M.Sc. Tech. (Manc.), The Hollies, Mile End, Stockport.
- Tarn, Francis Godfrey, 14, Home Park Road, Wimbledon, London, S.W.
- Watson, John Adam, A.C.G.I., 80, Oakwood Road, Golders Green, London, N.W.

New Students.

- Beach, Frederick Frank, 18, Prince Street, Bristol.
- Caird, Miss Ella, Lyndhurst, Regent's Park Road, Finchley, London, N.
- Jones, William Forster, 5, Forest Grove, Treforest, Glam.
- Macqueen, John Melven, The Poplars, College Square, Llanelli, Carm.

DEATHS.

Fellows.

- Brock, John.
- Macdougald, George Duncan.
- Smith, Ewing.
- Theobalds, Vincent William.

General Notices.

Intermediate and Final Examinations: July, 1916.

The next Intermediate and Final Examinations will be held in July.

The Final Examination in Branch (c), the Chemistry and Microscopy of Food and Drugs, etc., is open to Fellows and Associates who desire to obtain the Certificate of the Institute in Therapeutics, Pharmacology, and Microscopy. This Certificate is accepted by the Local Government Boards under the Regulations as to the competency of Public Analysts.

For further particulars, and forms of application, communications should be addressed to the Registrar.

The entry list for the July examinations will be closed on Tuesday, May 23rd.

Examination in Biological Chemistry.—An Examination in Biological Chemistry, Bacteriology, Fermentation and Enzyme Action will be held in October, 1916.

Notice to Associates.—Associates elected prior to April, 1913, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry for at least three years since their election to the Associateship, may obtain forms of application for election to the Fellowship.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in making known suitable appointments for professional chemists.

Examinations in Chemical Technology, October, 1916.—The Chemical Technology Examinations Board will be prepared to hold an examination in October next. The exact date will be announced later.

The examination will be open only to Fellows and to those Associates who have been registered as such for at least one year, and who produce satisfactory evidence of technological training or experience.

Candidates who desire to present themselves are required to forward their applications and fees not later than Tuesday, September 12th, and to mention one important branch of industry, in connection with which their knowledge of the subjects of the examination may be tested.

For further particulars, application should be made to the Registrar.

The Institute's Building. — The *Architectural Review* for March, 1916, contains a description of the new premises of the Institute, with illustrations of the building, the main entrance, the vestibule staircase, the Council Room, the Library and the main laboratory, also plans of the ground floor and second floor.

Glass Research.—An account of the work of the Glass Research Committee of the Institute was published in *The Engineer*, March 24th, 1916.

Beit Fellowships for Scientific Research.—The Fourth Election of Fellows will take place on or about July 15th, 1916. Not more than three Fellowships will be awarded. Applications must be received on or before April 15th, 1916. Forms of application and all information may be obtained by letter only, addressed to the Rector, Imperial College, South Kensington, London, S.W.

THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED, 1877.
INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,

1916.

PART III.

PROCEEDINGS OF THE COUNCIL (MARCH—JULY, 1916).
THE LIBRARY.
EXAMINATIONS.
MEMBERS AND STUDENTS WITH THE FORCES.
CHANGES IN THE REGISTER.
NOTICES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,
August, 1916.

Proceedings Committee, 1916-17.

HORATIO BALLANTYNE (*Chairman*),

SIR JAMES J. DOBBIE (*President*),

EDWARD J. BEVAN,

M. O. FORSTER,

ALEXANDER LAUDER,

H. R. LE SUEUR,

D. NORTHALL-LAURIE,

P. A. ELLIS RICHARDS,

W. H. ROBERTS,

W. LINCOLNE SUTTON,

THOMAS TICKLE.

Proceedings of the Council.

MARCH—JULY, 1916.

Conjoint Board of Scientific Societies.—At the meeting of Council held in March, Sir James J. Dobbie, President, and Professor Herbert Jackson, Vice-President, were nominated, as the representatives of the Institute to attend a Conference to consider the establishment of a Conjoint Board of Scientific Societies for the purpose of promoting the co-operation of those interested in pure and applied science ; of supplying a means by which the scientific opinion of the country might, on matters relating to science, industry, and education, find effective expression ; of taking such action as might be necessary to promote the application of science to our industries and to the service of the nation ; and of discussing scientific questions in which international co-operation seemed advisable. The Conference was held on the initiative of the Royal Society at their Rooms on March 22nd, when the proposals were discussed, and it was decided that the Conjoint Board should be formed for the furtherance of the objects indicated.

In pursuit of these objects the Conjoint Board of Scientific Societies will be empowered to take such action as may seem to it desirable ; in particular to form Committees, to hold conferences, to take part in deputations to public officials, and to publish statements.

Reports of the proceedings will be submitted to the Societies represented thereon.

The appointment of Sir James Dobbie and Professor Jackson as representatives of the Institute on the Board has

been duly confirmed, and Professor Jackson has been elected a member of the Executive Committee.

Committee on Neglect of Science.—At a meeting of the Council held in April, a letter was received from Sir E. Ray Lankester submitting the views of the Committee on Neglect of Science and inviting representatives of the Institute to attend a Conference to pass resolutions in favour of promoting the extension of science teaching in schools.

Mr. Edward Bevan and Dr. M. O. Forster, Vice-Presidents, Mr. A. Gordon Salamon, Hon. Treasurer, and Professor G. T. Morgan, Member of Council, were appointed as representatives of the Institute for this purpose.

The Conference was held at the rooms of the Linnæan Society on Wednesday, May 3rd, 1916, Lord Rayleigh in the chair, when the following resolutions were passed :—

(1) That in the opinion of this meeting it is a matter of urgency, in order to promote national efficiency in the near future, that the natural sciences should be made an integral part of the educational course in all the great Schools of this country, and should form part of the entrance examination of the Universities of Oxford and Cambridge, as well as of the newer Universities.

(2) That it is in the highest degree desirable that the Government should exercise the large power which it possesses of encouraging the study of the natural sciences, and thereby increasing the efficiency of our public servants—(1) by assigning capital importance to the natural sciences in the competitive examinations for the Home, Foreign, Colonial, and Indian Civil Service; (2) by requiring some knowledge of the natural sciences from all candidates for admission to Sandhurst.

(3) That this meeting is of the opinion that the method indicated in Resolution (2) is the only one by which it is practicable to bring about the desired change in the attitude of the Schools and Colleges throughout the country towards the natural sciences, and to make some knowledge and understanding of those sciences general. As the result of such changes will only develop in the course of years, it is urgent that the matter should be at once taken in hand by His Majesty's Government.

(4) That the Committee are authorised to take such steps as they may consider appropriate in order to bring these views to the notice of His Majesty's Government.

The views embodied in the Resolutions were endorsed by the Professors of the Imperial College of Science and Technology, and thereby came under the notice of Lord Crewe, Chairman of the Governing Body of the College, who occupies the

position of President of the Council and Chairman of the Privy Council Committee on Scientific and Industrial Research. At a meeting of the Governing Body of the College held subsequently, Lord Crewe referred to the announcement that a Government Committee presided over by the Prime Minister had been appointed to deal with all matters involving the reconstruction of our national life. It had been thought wise that this Committee should undertake the general supervision and review of the changes which might be required in our national system of education, and it was the intention of the Government to appoint a Special Committee to inquire into the question of scientific teaching. The Special Committee would include scientific men in whom the country would have confidence, men who appreciated the application of science to commerce and industry, and others who were able from general experience to correlate scientific teaching with education as a whole. Lord Crewe himself had been asked to preside over it, and its general object would be, broadly speaking, to inquire into the position of the natural sciences in our educational system, especially in universities and secondary schools. Its duty would be to advise the authorities how to promote the advancement of pure science and also the interest of trades, industries and professions dependent on the application of science, bearing in mind the needs of what was described as a liberal education.

Overseas Branches of the Institute.—The Council, having had under consideration letters received from chemists in Canada and Australia suggesting the establishment of Overseas Branches of the Institute, appointed a Special Committee to consider and report on the proposal.

The Committee expressed themselves in strong sympathy with the suggestion, provided that precautions were taken to uphold the existing standards of the Institute, and appointed a Sub-Committee to consider the terms upon which such branches should be established.

The Sub-Committee submitted draft rules, which after

receiving the approval of the Special Committee and the Council, were communicated to the Honorary Corresponding Secretaries and other members and chemists interested in the movement, whose comments and suggestions have been invited thereon.

The Council feel that particularly at the present time every step should be taken to bind together chemists within the Empire for the furtherance of their profession in the interests of Imperial industry and commerce, and will report more fully on the matter in due course.

Buildings Fund.—The Finance Committee have received from Sir John Burnet a statement of the outstanding liabilities on the new building, from which they learn that the estimates referred to in the Report of the Council for 1915-16 did not include professional fees, or charges due to the Bedford Estate in connection with the lease; further, that the accounts of contractors and sub-contractors in respect of work completed since the outbreak of war had been affected by prevailing circumstances.

The Committee are of opinion that an endeavour should be made to raise a sum of £3,000 to £3,500 in order to meet the immediate deficiency and to provide for more complete equipment and furnishing. An appeal, accompanied by an explanatory pamphlet, is being addressed to companies and firms asking them to assist in placing the affairs of the Institute on such a basis as to relieve the Council from further anxiety in the matter, and to enable the Institute to develop its work and activities, especially in view of the urgent importance of affording the country every assistance in the industrial activity which will undoubtedly follow on the cessation of hostilities. Copies of the pamphlet will be sent to any Fellow or Associate who may be able to bring the appeal to the notice of likely contributors.

Glass Research.—The following schedule includes the list of formulas reported to the Council by Professor Jackson and Dr. Merton since the appointment of the Glass Research

Committee in October, 1914. The names of firms making glass according to such formulas have been incorporated in order to afford chemists as much information as possible on the production of British-made glassware.

The firms are indicated as follows :—

- (a) Messrs. Wood Bros. Glass Co., Ltd., Borough Flint Glass Works, Barnsley.
- (b) Messrs. John Moncrieff, Ltd., Perth.
- (c) Messrs. James Powell & Sons, Whitefriars Glass Works, Tudor Street, London, E.C.
- (d) Messrs. Frank Toney & Co., Ltd., Borough Glass Works, 263, Victoria Road, Aston, Birmingham.
- (e) The Edinburgh and Leith Flint Glass Co., Norton Park, Edinburgh.
- (f) Messrs. A. C. Cossor, Ltd., 59, Clerkenwell Road, London, E.C.

Formulas prepared between October, 1914, and October, 1915.

- 1. Soft glass, suitable for ordinary chemical laboratory ware. (Since modified; see No. 13 below.)
- 2. A similar glass for ordinary chemical laboratory ware—(a).
- 3. Resistant glass, suitable for apparatus and for pharmaceutical purposes, ampoules, etc.—(a), (b).
- 4. Glass for combustion tubing.
- 5. Ditto (b).
- 6. Miners' lamp glasses. (See note (1) on p. 8.)
- 7. Ditto.
- 8. Resistance glass. (See note (2) on p. 8.)
- 9. Alternative for combustion tubing.
- 10. Soft soda glass, suitable for tubing and X-ray bulbs—(a), (c), (d).
- 11. Ditto. (Alternative, see No. 14 below.)
- 12. Lead glass suitable as an enamel for sealing platinum into soft glass—(c).
- 13. Soft glass suitable for ordinary chemical laboratory ware. (Alternative to No. 1)—(b). (See note (3) on p. 8.)
- 14. Soft soda glass of fine working quality, suitable for tubing, X-ray bulbs, etc. (Alternative to No. 11)—(e).

Formulas prepared since October, 1915 under Grants from the Advisory Council on Scientific and Industrial Research.

- (I.) 15. Blue enamel for sealing metallic wire into glass—(e).
- (II.) 18. Opal glass which does not lose its opal character on repeated working in the blow-pipe flame—(a), (c), (d), (e).
- (III.) 16 and 17. For the manufacture of electric light bulbs—(a).
- (IV.) 19 and 21. High temperature thermometer glass and ordinary temperature thermometer glass—(c), (d), (e).
- (V.) 20. Leadless opal glass suitable for working with certain thermometer glasses to form the enamel backing—(c), (d), (e).
- (VI.) 22. Glass of the same physical properties as fluor crown (6781)—(a). (See note (4) on p. 8.)

- (VII.) 23. Glass having optical properties and chemical composition similar to one known as "Prism Crown"—(a). (See note (5) below.)
 (VIII.) 24. Glass similar in optical properties and chemical composition to a glass described as a "Heavy Flint"—(a). (See note (5) below.)
 (IX.) 25. Glass for the "shell" of artificial human eyes—(e).
 (X.) 26. Ruby glass suitable for making veins in artificial human eyes—(e).
 (XI.) 27. Glass suitable for making the lens of an artificial human eye—(e).
 (XII.) 28. Soft glass suitable for filling in brass caps of incandescent electric lamps—(e), (f).

Formulas recently reported and about to be communicated to various firms.

- (XIII.) 29. A new enamel glass suitable for sealing-in various metallic wires, including copper, iron and nickel. This enamel glass makes a satisfactory joint with soft soda glasses and with many lead glasses.
 (XIV.) 30. A modification of "eyeshell" glass. (Alternative to IX.—25).
 (XV.) 31. A formula for an opal glass intended for small electric bulbs with opal backing. A bulb blown from the glass remains clear on cooling, but can be "struck" opal by re-heating to a lower temperature. By heating the front part of the bulb to a rather higher temperature this portion becomes clear again and remains so, leaving an opal reflecting back.
 (XVI.) 32. A formula for a batch mixture suitable for making a white bottle glass.
 (XVII.) 33. Two formulas for lead glass of high density, such as is required for efficient X-ray shields. It is considered necessary that sheet glass for this purpose should have a specific gravity of not less than 3·8.

NOTES.

(1) Messrs. John Moncrieff, Ltd., of Perth, have made miners' lamp glasses to this formula; Messrs. Ackroyd & Best, of Morley, Yorks, are also making miners' lamp glasses.

(2) Messrs. John Moncrieff, Ltd., of Perth, are making similar glass according to a formula of the British Laboratory Ware Association.

(3) Messrs. Baird & Tatlock (London), Ltd., are making laboratory ware of glass closely resembling this.

(4) Messrs. Chance Bros. & Co., Ltd., Birmingham, will probably make this glass in the near future.

(5) Messrs. Chance Bros. & Co., Ltd., Birmingham, make similar glass.

The formulas numbered (IX.) 25 to (XVII.) 33 have been received since the publication of Proceedings, Part II., in April last.

The Committee have ascertained from Messrs. Chance Bros. and from representative opticians particulars of other kinds of optical glass likely to be in demand, and investigations are being conducted with a view to the production of the requisite formulas. Experiments are also being made with the object of suggesting a reliable method of testing the durability of optical glass.

The Solicitor of the Board of Trade having directed attention to the fact that an association of dealers in laboratory apparatus had applied for the registration of a standardisation mark, the Council appointed Professor Jackson and Mr. Gordon Salamon, Honorary Treasurer, to represent the Institute at a hearing with reference to this matter held at the offices of the Board of Trade on May 1st.

It was proposed by the applicants that the mark should be applied to glass and porcelain laboratory ware by firms working under licence from the association, and it was stated that the mark was intended to guarantee the standard of the supplies of laboratory glassware, porcelain, and filter paper. The regulations governing the use of the mark, in the event of the application being allowed, were discussed, and it was stated that they had been modified by a provision to the effect that licences would only be granted to British firms.

The representatives of the Institute expressed the opinion that if the mark were allowed, the restriction of its use to British firms was essential. The Institute was in no way antagonistic to the association, but as representing a large body of users would prefer to see laboratory ware marked by the *actual manufacturers*, so as to give sufficient indication of the source of production. There did not appear to be any necessity for a standardisation mark, since the standard would be constantly changing and they hoped improving.

The Registrar of Designs and Trade Marks, who was present at the hearing, indicated that it was rather unusual to grant standardisation powers to a private body; hitherto they had been given to national or *quasi*-national institutions.

The result of the inquiry has not yet transpired.

The Glass Research Committee have represented to the Board of Trade, as co-patentees, and to the Advisory Council that in their opinion it is not desirable to complete the patents which have been provisionally applied for, as the formulas would have to be published and this course would not be in the best interests of British firms using them.

The Committee have had many matters referred to them and have been asked to suggest suitable glass for various purposes other than those already indicated, such as for pavement lights, milk bottles, medicine vials, etc.

A collection of British-made laboratory apparatus is in course of formation and will be on view at the Institute during the months of August and September.

Clay Research.—On behalf of the Ministry of Munitions, Professor Jackson has undertaken also, in conjunction with the Glass Research Committee, certain investigations with regard to the clay used for making pots employed in the manufacture of optical and chemical glass. The expense involved will be borne by the Ministry, by arrangement with the Institute, and the information derived from the inquiry will, subject to written consent to the contrary, be at the disposal of the Ministry only for such use as the Department may decide.

Public Appointments.—A number of public analytical appointments having become vacant in Scotland, the Council addressed a communication to the Local Government Board, Edinburgh, on the subject of the qualifications required for such posts.

Attention was directed to the fact that in one instance the local authority invited the applicants to state the scale of fees they were willing to accept. The Council expressed to the authority their views on the undesirability of inviting professional men to tender for appointments, pointing out that the Local Government Board for England and Wales had already objected to the practice.

History of the Institute, 1877-1914.—The publication of the Special Edition of the History of the Institute has been delayed owing to the difficulty of obtaining suitable paper. Copies are now in the hands of the binders and will be forwarded to the subscribers in the near future. The thanks of the Council have been accorded to Mr. William Bacon, F.I.C.,

for advice in the selection of the paper for the main press matter, which has been kindly presented by Messrs. Balston & Sons, of Maidstone.

Any profit derived from the sale of copies, of which a few are yet obtainable at 10s. 6d., will be credited to the Building Fund.

Unauthorised Use of F.I.C.—In Proceedings, Part II., reference was made to the unauthorised use of the initials "F.I.C.," by an individual who produced a certificate headed "Royal Institute of Chemists, London, 1913." The Council have been unable to trace the existence of any Institute bearing that title, and the individual concerned has undertaken to refrain from using any title or initials implying that he is a Fellow of the Institute of Chemistry.

Professional Chemists and the War.—The Institute has continued to afford assistance to Government Departments by securing the services of chemists for various purposes connected with the prosecution of the war. The special register maintained for this purpose is available to any British chemist whether or not previously enrolled by the Institute.

The Council wish it to be known that Members and Registered Students serving with the forces are specially welcome at the Institute when they are in London, and the housekeeper will provide them with light refreshment at all convenient times.

The Council are pleased to note that Dr. George Thomas Beilby, F.R.S., Past President of the Institute, has received the honour of Knighthood, and that Colonel William Henry Willcox, Member of Council, has received the Companionship of the Most Distinguished Order of St. Michael and St. George.

The following have received military decorations:—

Fellows.

McCombie, Captain Hamilton	..	Military Cross.
Merrett, Major W. H.	..	.. Territorial Decoration.

Associates.

Laughton, 2nd Lieut. F. E.	..	..	Military Cross.
Walker, Captain F. G. C.	..	..	Military Cross.
White, 2nd Lieut. J. C.	..	..	Military Cross.

Students.

Cooper, 2nd Lieut. William	..	..	Military Cross.
Cousins, Corporal F. G.	..	..	D.C.M.
Wilson, Lieut. D. M..	..	..	Military Cross.

Examinations.—The Council have received the Report of the Board of Examiners on the July Examinations, an abstract of which is given on pp. 14—22 of this Part of the Proceedings.

The thanks of the Council have been accorded to the Governors of the Royal Technical College, Glasgow, and the Department of Agriculture and Technical Instruction for Ireland, for the use of examination rooms and laboratories, and to Professors G. G. Henderson and G. T. Morgan for supervising the local examinations.

Honorary Corresponding Secretary.—Dr. Gilbert J. Fowler, Professor of Applied Chemistry in the Indian Institute of Science, Bangalore, has been appointed an Honorary Corresponding Secretary of the Institute.

The Register.—The Council have decided that, in view of the continued absence of a very large number of the Fellows, Associates and Students from their ordinary addresses and the desirability of exercising economy, the Register of the Institute be not printed this year.

The Library.

In addition to the gifts reported in Proceedings, Part II., the Library Committee have pleasure in acknowledging the following :—

EDWARDS, H. LEATON, F.I.C. :

A Collection of Volumes and Parts of *Nature* required to complete the Institute's set.

ATAK, F. W., M.Sc., F.I.C. :

The Chemist's Year Book, 1916. (2 Vols.) F. W. Atak. *Manchester*, 1916.

BOLTON, E. RICHARDS, F.I.C. :

Fatty Foods—Their Practical Examination. E. Richards Bolton and Cecil Revis. *London*, 1916.

T. H. NORRIS, F.I.C. :

Dr. Ure's Dictionary of Arts, Manufactures, etc. Andrew Ure, M.D. *London*, 1843.

E. HANDFIELD MORTON :

Municipal and Sanitary Engineer's Handbook. Percy Boulnois, M.Inst.C.E. *London*, 1892.

Examination of Water. Henry Leffmann, M.D. *Philadelphia*, 1895.

Chemical Phenomena of Iron Smelting. I. Lothian Bell. *London*, 1872.

Spectrum Analysis. Henry E. Roscoe, B.A., Ph.D., F.R.S. *London*, 1873.

Abstract of the
Report of the Board of Examiners
 ON THE
INTERMEDIATE AND FINAL EXAMINATIONS.
JULY, 1916.

BOARD OF EXAMINERS.

Chairman : Sir James Johnston Dobbie, LL.D. (Glas.), D.Sc. (Edin.), F.R.S.,
President.

For the Intermediate Examination and in General Chemistry :

Arthur Harden, D.Sc. (Vict.), Ph.D. (Erlangen), F.R.S., F.I.C. (*Examiner,
 pro tem.*)

For the Final Examination .

- | | | |
|--|----|---|
| (a) Mineral Chemistry | .. | George Nevill Huntly, B.Sc., A.R.C.S.
(Lond.), F.I.C. |
| (b) Metallurgical Chemistry | .. | Cecil Henry Desch, Ph.D. (Würzburg),
D.Sc. (Lond.), F.I.C. |
| (c) Physical Chemistry | .. | Frederick George Donnan, M.A. (Q.U.B.),
Ph.D. (Leipzig), F.R.S., F.I.C. |
| (d) Organic Chemistry | .. | William Jackson Pope, M.A. (Cantab.),
F.R.S., F.I.C. |
| (e) The Chemistry (and Micro-
scopy) of Food and
Drugs, Fertilisers and
Feeding Stuffs, Soils and
Water. | | Bernard Dyer, D.Sc. (Lond.), F.I.C. |
| Therapeutics, Pharmaco-
logy and Microscopy. | | Frederick Gowland Hopkins, D.Sc., M.B.
(Lond.), M.A. (Cantab.), F.R.S., F.I.C. |
| (f) Biological Chemistry, Bac-
teriology, Fermentation
and Enzyme Action. | | Alfred Chaston Chapman, F.I.C. |

The Board report that the Examinations were held at the places and on the dates mentioned below :—

Intermediate Examination : At the Institute and at the Royal Technical College, Glasgow, July 3rd to 7th.

Final Examination : Branch (a) : At the Royal Technical College, Glasgow, July 3rd to 7th.

Branch (d) : At the Institute, at the Royal Technical College, Glasgow, and at the Royal College of Science for Ireland, Dublin, July 3rd to 7th.

Branch (e) : At the Institute, July 3rd to 7th.

The results are shown in the following table :—

			NUMBER EXAMINED.		NUMBER PASSED.
Intermediate Examination	..	..	5	..	5
Final Examination :—					
Branch (a), Mineral Chemistry	..	..	2	..	2
Branch (d), Organic Chemistry	..	..	8	..	5
Branch (e), Chemistry (and Microscopy) of Food and Drugs :					
For Associateship	..	..	2	..	2
For Fellowship	..	..	1	..	1
			<u>18</u>		<u>15</u>

Intermediate Examination.—All the candidates reached the necessary standard for passing the examination. The theoretical papers generally were well answered. In the practical examination the quantitative determinations were as a rule done with considerable accuracy, although some errors of judgment were made. The preparation work, both organic and inorganic, was fairly well done, and the qualitative very well. On the whole, the candidates showed that they had a good practical knowledge of the subject.

Final Examination.—In Branch (a) both Candidates satisfied the Board.

In Branch (d) the written paper showed an improvement over previous examinations in theoretical work. The three candidates who failed were weak in practical work.

In Branch (e) the work was satisfactory throughout.

The following Candidates passed the Intermediate Examination :

Francis, Arthur Clarence	..	..	Heriot-Watt College, Edinburgh.
Garbutt, Phyllis Louisa	..	..	King's College for Women, London.
Hall, Archibald John	..	..	B.Sc. (Lond.). With J. B. Coleman, A.R.C.S.I., F.I.C.
Hegan, Horace James	..	..	B.Sc. (Lond.), The University, Birmingham.
Sandilands, James	..	..	Heriot-Watt College, Edinburgh.

Candidates who passed the Final Examination for the Associateship (A.I.C.) :

In Branch (a), Mineral Chemistry.

Macintyre, Ernest Gunn	..	..	B.Sc. (Glas.). The University and Royal Technical College, Glasgow.
Stewart, Andrew	..	..	B.Sc. (Glas.). The University, Glasgow.

In Branch (d), Organic Chemistry.

Brannigan, Peter Joseph	..	..	M.Sc. (Q.U.B.). Queen's University, Belfast ; and The Royal College of Science for Ireland, Dublin
Hopkins, Thomas	..	..	B.Sc. (Lond. and Wales). University College, Aberystwyth ; and University College, Nottingham.
Madden, Denis	..	..	A.R.C.S.I. The Royal College of Science for Ireland, Dublin.
Ogilvie, James	..	..	B.Sc. (Edin.). The University and Heriot-Watt College, Edinburgh.
Wells, Ernest Edmund	..	..	B.Sc. (Lond.). The University, Oxford.

In Branch (c), The Chemistry (and Microscopy) of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water.

Cox, Henry Edward	..	..	B.Sc. (Lond.). With John Evans, F.I.C.
McEwan, Thomas Lawson	..	..	B.Sc. (St. Andrews). University College, Dundee ; and with Cecil H. Cribb, B.Sc., F.I.C.
† Wood, James	..	..	M.A., B.Sc. (Aberd.). The University, Aberdeen ; and with W. Collingwood Williams, F.I.C.

† For the Fellowship.

PAPERS SET AT THE JULY EXAMINATIONS.

Intermediate Examination.

LONDON AND GLASGOW.

GENERAL AND THEORETICAL CHEMISTRY.

TUESDAY, JULY 4th, 1916: 10 a.m. to 1 p.m.

(Candidates are expected to attempt all the questions.)

1. One gram of the chloride of a metal yielded with silver nitrate 3.017 grams of silver chloride. The vapour of the chloride had the density of 6.61 compared with air. Calculate the equivalent weight of the metal and state what conclusions can be drawn as to the formula of the chloride. ($\text{Cl} = 35.5$; $\text{Ag} 107.9$.)

What further information would you require in order to assign a definite atomic weight to the metal in question?

2. Describe a method for the commercial preparation of iodine and explain how you would obtain pure iodine from the commercial product. How, and under what conditions, does iodine react with the following substances: (a) caustic potash solution; (b) chlorine; (c) potassium chlorate; (d) hydrogen sulphide; (e) sulphur dioxide?

3. "The characteristic properties which acids have in common are due to the presence of hydrogen ions."

Give an account of the experimental evidence on which this statement is based.

4. What are the sources of zinc, how is the metal obtained, and what are its chief uses? How would you prepare a sample of pure zinc from the commercial metal?

5. Explain what is meant by the term chemical equilibrium and discuss the effect of temperature, pressure, the mass of the reacting substances, and the presence of catalysts on the equilibrium in chemical systems.

6. Describe the methods employed in the quantitative estimation of the metals by electrolysis, give some instances and explain how in some cases metals can be separated by electrolysis.

2 p.m. to 5 p.m.

(Candidates are expected to attempt all the questions.)

1. Give a brief account of the preparation of the following substances, and state for what purposes they are used in organic work: (a) Grignard's reagent; (b) nitrosyl chloride; (c) malonic ester; (d) semicarbazide.

2. Explain the grounds upon which the constitutional formulæ of naphthalene, anthracene and phenanthrene have been assigned to these hydrocarbons.

3. Give a short account of the constitution, general properties and modes of synthesis of the glucosides.

4. A monobasic acid of the composition C, 76.6 per cent.; H, 12.1 per cent., O, 11.3 per cent. combines with bromine to form an acid containing 36.2 per cent. of bromine. The original acid was converted by oxidation with permanganate into a mixture of two acids the silver salts of which contained 53.7 per cent. and 40.7 per cent. of silver respectively. Ascertain the molecular formulæ of the various substances concerned and suggest a

constitutional formula for the original acid. ($\text{Ag} = 107.9$; $\text{Br} = 79.9$.)

5. Describe as fully as you can the preparation of an azo-dye, and state under what conditions the substance you have selected can be used as a dye.

6. Describe the preparation of the alkali cyanides. How would you prepare (a) cyanogen; (b) anhydrous hydrocyanic acid; (c) potassium cyanate; (d) ethyl cyanide; (e) ethyl isonitrile?

PRACTICAL CHEMISTRY.

WEDNESDAY, JULY 5th, 1916: 10 a.m. to 4.30 p.m.

The solution A contains oxalate, sulphate and chloride of ammonium. Ascertain by analysis the number of grams per litre of each salt present.

THURSDAY, JULY 6th, 1916: 10 a.m. to 4.30 p.m.

Prepare a specimen of crystallised magnesium sulphate from the specimen of dolomite supplied.

Examine qualitatively the alloy B.

FRIDAY, JULY 7th, 1916: 10 a.m. to 4.30 p.m.

1. Prepare from alcohol a specimen of ethyl acetate and determine its boiling point.

2. The solution C contains an organic substance. Determine the specific gravity of the solution at 15° and examine the nature of the dissolved substance, and if possible identify it. (Glycerol.)

Final Examinations for the Associateship.

Branch (a).—Mineral Chemistry.

GLASGOW.

MONDAY, JULY 3rd, 1916: 10 a.m. to 1 p.m.

(Five questions only to be attempted, of which No. 6 must be one.)

1. Give an account of the reactions between nitric oxide and

(a) an alkaline solution of potassium sulphite;

(b) tin and warm hydrochloric acid;

(c) liquid oxygen.

Describe how the main products of each of these reactions can be isolated and identified.

2. Give a critical account of the methods which have been proposed for the utilisation of nitre cake.

3. Describe the preparation and uses of sodium hyposulphite ("hydro-sulphite"). Give its constitutional formula together with the full evidence on which this formula is based.

4. A fire in an enclosed space has been extinguished by introducing the products of combustion of sulphur in air. Describe the mode of extraction and analysis of a sample of the resulting gas, which may be assumed to contain nitrogen, oxygen, sulphur dioxide, carbon monoxide and dioxide only.

5. Give an account of the methods in current use for the manufacture of magnesium. Mention the impurities in the metal peculiar to each method, and draw up a scheme for estimating them.

6. Write a short essay on one of the following :—

- (a) The application of the X-rays to the study of crystal structure.
- (b) Glass manufacture from the chemical standpoint.
- (c) Recent work on the higher oxides of nitrogen.

TUESDAY, JULY 4th, 1916 : 10 a.m. to 4.30 p.m.

Make a full qualitative analysis of the ore A, and estimate the three main constituents. (Wolfram.)

(This exercise may be continued on subsequent days.)

WEDNESDAY, July 5th, 1916 : 10 a.m. to 4.30 p.m.

Make an analysis of the sample of commercial hydrogen peroxide, returning the percentages of hydrogen peroxide and of the impurities.

THURSDAY and FRIDAY, JULY 6th and 7th, 1916 :

10 a.m. to 4.30 p.m.

Determine the percentage of sulphur and the *apparent* specific gravity of the sample of coke.

Prepare a specimen of lead dioxide, and determine the purity of your product.

Branch (d).—Organic Chemistry.

LONDON, GLASGOW AND DUBLIN.

MONDAY, JULY 3rd, 1916 : 10 a.m. to 1 p.m.

(The Candidate is expected to attempt all the questions.)

1. How may the unsaturated acids of the composition, $C_4H_4(CO.OH)_2$, be obtained, and how may they be converted one into another ?

2. Write an account of our present knowledge of the Walden Inversion.

3. Describe the methods of preparation of tetranitromethane and state the more important reactions of this substance.

4. What views are now held as to the constitution of the diazo-compounds and upon what experimental evidence are they based ?

5. What derivatives of anthracene are of technical importance ? Briefly indicate their uses and their methods of preparation.

TUESDAY, JULY 4th, 1916 : 10 a.m. to 4.30 p.m.

Determine the nature of the sample of hydrocarbon A. Prepare from it specimens of any crystalline substances you can and characterize your products. (Xylol-benzine.)

WEDNESDAY, JULY 5th, 1916: 10 a.m. to 4.30 p.m.

Make a qualitative and quantitative determination of the bases contained in the given solution B. (Mono- and diethylamine hydrochlorides.)

THURSDAY, JULY 6th, 1916: 10 a.m. to 4.30 p.m.

You are provided with technical mononitrotoluene, C. Prepare from it 4-nitro-1-toluene-2-sulphonic acid and 2-nitro-1-toluene-4-sulphonic acid in the form of their pure sodium salts.

FRIDAY, JULY 7th, 1916: 10 a.m. to 4.30 p.m.

Determine the important technical constants of the given vegetable oil D, and report upon the purity and nature of the material. (Olive oil.)

Branch (c). The Chemistry and Microscopy of Food and Drugs, Fertilisers and Feeding Stuffs, Soils and Water.

LONDON.

MONDAY, JULY 3rd, 1916: 10 a.m. to 1 p.m.

1. Give some brief account of the general chemical structure of proteins, and indicate generally what happens in the process of their digestion.

Maize meal (containing about 10 per cent. of protein) and maize-product meals (which may contain 15 or more per cent. of protein) are largely used as food for pigs; but satisfactory results are obtained only when their use is supplemented by that of some other protein-containing food. What explanation has been given of this?

2. Describe, exactly, how you would determine (a) the quantity of nitrogen present in the form of nitrates in drinking water, (b) the quantity of nitrogen in a sample of nitrate of soda.

3. State briefly what you know of the present position of the question of the permissibility of the use of boric acid in the preservation of (1) milk, (2) cream.

(Answer in a separate book.)

1. Give an account of the biological relations of ergot; and state what you know concerning the active principles contained in it. Enumerate its official preparations, giving the medicinal dose in each case. What symptoms may follow upon an overdose of ergot?

2. State as fully as possible how you would distinguish between arsenic and antimony when contained in the organs of a deceased person. Give for each of these substances an exact and critical account of the quantitative method used for its estimation in toxicological practice.

3. Explain what, in pharmacy, is meant by "incompatibility." Mention any drugs or pharmaceutical preparations which would be incompatible with the following: Quinine sulphas; Liquor Ferri perchloride; Acidum Hydrocyanicum dilutum; Potassii Iodidum; Antimonium tartaratum; Chloral hydras; Acidum salicylicum.

2 p.m. to 5 p.m.

1. Examine microscopically and report upon the powder A.
2. The sample of Cider B contains a poison which is not an alkaloid. Decide upon its nature, and proceed with its estimation so far as time permits.

Oral Examination in the Recognition of Drugs and Chemicals.

TUESDAY, JULY 4th, 1916: 10 a.m. to 4.30 p.m.

1. Determine approximately the proportion of "tar acids" in the sample of Carbolic Soap. (This exercise may be completed to-morrow.)
2. The Wine submitted to you contains a hypnotic drug. Identify it, and determine its approximate proportion. (Veronal.)

WEDNESDAY, JULY 5th, 1916: 10 a.m. to 4.30 p.m.

1. Report on the sample of Coffee.
2. Determine the "saponification value" and the "acetyl value" of the sample of oil.

THURSDAY, JULY 6th, 1916: 10 a.m. to 4.30 p.m.

1. Determine as exactly as you can, by the Marsh-Berzelius process, the arsenic in the sample of Beer, stating the result in fraction of a grain of As_2O_3 per gallon. (Apparatus and pure zinc and acid provided.)
2. Determine the percentages of lime and of phosphoric acid in the sample of Soil. (The phosphoric acid determination may be completed to-morrow.)

FRIDAY, JULY 7th, 1916: 10 a.m. to 4.30 p.m.

Examine as fully as you can the sample of Syrup, and report on its composition.

Candidates for the Final Examination were required to translate passages from French and German technological literature.

TRANSLATION.

Time allowed: $1\frac{1}{2}$ hours.

Translate into English.

Die Oxydierbarkeit der primären Alkohole bringt es mit sich, dass sie unter Umständen auch solchen Verbindungen gegenüber, die man nicht gerade als eigentliche Oxydationsmittel zu betrachten gewohnt ist—z. B. Quecksilberchlorid, aromatische Ketone—reduzierende Eigenschaften betätigen (meist jedoch erst bei höherer Temperatur); vgl. auch S.213 die stärker reduzierenden Eigenschaften der Alkoholate.

Der Einwirkung oxydierend Mittel ist in mancher Beziehung die pyrochemische Zersetzung der Alkohole vergleichbar. Unter dem Einfluss hoher Temperaturen zerfallen die Carbinole vorwiegend in Alkylene und Wasser; dieser "Dehydratation" gehen jedoch Reduktions- und Oxydations-Prozesse parallel, so dass sich im Reaktionsprodukt auch Paraffine, Aldehyde, Kohlenoxyd und Wasserstoff finden. Es hat sich nun gezeigt, dass man die Temperatur, bei der sich diese Umsetzungen vollziehen, durch Anwendung sogenannter "Kontaktsubstanzen" z. B. Kohle, Graphitiegelmasse, Tonerde, Metalle usw., wesentlich herabsetzen und hierdurch den Verlauf des pyrogenetischen Prozesses so weit regeln kann, dass eine ergiebige Gewinnung definierter Produkte, z. B. bestimmter Kohlenwasserstoffe, Aldehyde und Aether, möglich wird. Leitet man mit Luft gemischte Alkoholdämpfe über glühende Metalle, z. B. eine Platinspirale, so treten—falls die Temperatur nicht zu hoch gewählt wird—die Oxydationsvorgänge in den Vordergrund und führen je nach den Versuchsbedingungen zur Bildung von Aldehyden $R\cdot CHO$ (bzw. aus sekundären und tertiären Alkoholen zu Ketonen), Äcetalen $R\cdot CH(OR)_2$ oder Säuren $R\cdot COOH$.—*Meyer-Jacobson.*

Pour les mélanges explosifs, il convient d'enfermer d'abord l'un des deux composants séparément dans un tube jaugé jusqu'au point de l'étranglement, de façon à en connaître la capacité. On le remplit par le procédé actuel, ou par tout autre, et l'on ferme à la lampe. Cela fait, on prépare un tube un peu plus large, en le pourvoyant d'abord d'un étranglement à une extrémité ou bien en l'y fermant (*voir* plus haut la figure 10). Puis, par l'orifice large de l'autre extrémité, on introduit le premier tube tout scellé: on étrangle ensuite à la lampe le tube enveloppant, avec la précaution d'y réserver un espace intérieur libre (déduction faite de l'espace occupé par le tube intérieur), dont la capacité réponde à peu près au volume probable du second gaz, et même soit un peu plus grande. On étrangle alors le tube enveloppant, au-dessous de l'orifice libre, et l'on jauge son contenu jusque vers le centre de l'effilure étranglée, à l'aide d'une burette graduée pleine d'eau, ou autrement.

On vide le tube de l'eau qu'on y a introduite, on le sèche avec précaution. Puis par tâtonnement, au moyen de la lampe, on ramène, s'il y a lieu, la capacité libre du tube enveloppant à un rapport donné avec celle du tube intérieur.

On remplit alors par déplacement avec le second gaz le tube enveloppant; puis on en scelle à la lampe l'effilure.

Enfin, à l'aide de secousses ménagées, on brise le tube intérieur et l'on opère ainsi le mélange des gaz dans un espace scellé d'avance à la lampe.

Ces tours de main sont fort délicats; ils ont paru valoir la peine d'être décrits. Ils m'ont servi dans diverses opérations et notamment pour mesurer au sein d'un calorimètre la chaleur dégagée par la réaction du bioxyde d'azote sur l'oxygène, ces deux gaz étant employés en rapports successifs de volume. (*Annales de Chimie et de Physique*, 5e série, t. VI., p. 162—169, 1875.)—*H. Berthelot.*

**FELLOWS, ASSOCIATES, STUDENTS AND
CANDIDATES FOR EXAMINATION WHO ARE SERV-
ING OR WHO HAVE SERVED WITH H.M. FORCES.
(SUPPLEMENTARY LIST.)**

*It is requested that any inaccuracy or omission be
reported immediately to the Registrar.*

FELLOWS.

Akers, N. C., Sub-Lieut. R.N.V.R.
Carruthers, G. M., Gordon Highlanders.
Friend, J. Newton, Lieut. General Service.
Gill, H. W., 4th Permanent Battery Horse Artillery (South African Mounted Rifles).
King, F. E., Lance-Corporal 9th Battalion East Surrey Regiment.
Lang, W. R., Lieut.-Colonel General Staff (Canada).
Levy, L. A., Lieut. General Service.
Smithells, Arthur, Lieut.-Colonel General Staff.
Summerson, S., Lieut. 2nd London Sanitary Company, R.A.M.C. (T.F.).

ASSOCIATES.

Campbell, N. P., Captain 7th Battalion Oxford and Bucks. Light Infantry.
Martin, E. C., 3/7th Battalion Essex Regiment.

STUDENTS.

Gibson, J., Corporal R.E.
Goodwin, S. W., Lance-Corporal University of London O.T.C.
King, F. J., R.N.A.S.
Robson, J. C., R.E.
Stewart, R. F., R.E.

Since the publication of the list given in Proceedings, Part II., entries have been altered in the following cases:—

FELLOWS.

Alton, W. L. St. J., Sergeant, Honourable Artillery Company.
Auld, S. J. M., Captain, Chemical Adviser, G.H.Q.
Blair, R. W., Lieut., 10th Battalion East Lancashire Regiment.
Eastburn, G. J., 2nd Lieut., 12th Battery Motor Machine Guns, X Corps.
Evans, B. S., 2nd Lieut., 4/4th Battalion The Queen's.
Hill, J. R., 2nd Lieut., R.E.
Willcox, W. H., C.M.G., Colonel R.A.M.C. (T.F.).

ASSOCIATES.

Gilmour, H., 2nd Lieut., 10th Battalion South Lanes. Regiment.

Clarke, A. L. R., Lieut., R.E.

Jones, E. O., 2nd Lieut., R.E.

Kent-Jones, D. W., 2nd Lieut., R.E.

STUDENTS.

Frith, J. S., Captain, 4th South Lanes. Regiment. (Mentioned in Despatches.)

Merheim, G., Quarter-Master-Sergeant, R.E.

The Register.

Since the publication of Proceedings, Part II., 1916, the Council have elected 15 Fellows and 9 new Associates; 13 Associates have been elected to the Fellowship, and 18 new Students have been admitted. The Institute has lost 8 Fellows and 4 Students by death.

New Fellows.

- Bolton, Edward Richards, 46, Stamford Brook Road, Hammersmith, London, W.
- Boon, Alfred Archibald, D.Sc. (Edin.), Heriot-Watt College, Edinburgh.
- Brown, Herbert Edon, c/o Nitrogen Products and Carbide Co., Ltd., Winchester House, Old Broad Street, London, E.C.
- Caldwell, Professor William, M.A. (R.U.I.), M.A., Sc.D. (T.C.D.), Royal College of Surgeons in Ireland, Stephen's Green, Dublin.
- Farmer, Robert Crosbie, D.Sc. (Liverpool), Ph.D. (Würzburg), 42, Heriot Road, Hendon, London, N.
- Fox, John Jacob, D.Sc. (Lond.), Government Laboratory, Clement's Inn Passage, London, W.C.
- Gray, Thomas, D.Sc. (Glas.), Ph.D. (Jena), Royal Technical College, Glasgow.
- Hadfield, Sir Robert Abbott, Hon. D.Met. (Sheffield), Hon. D.Sc. (Leeds), F.R.S., 22, Carlton House Terrace, London, S.W.
- Isherwood, Percy Claude Cameron, Ph.D. (Würzburg), Moss Cottage, Bushey Heath, Herts.
- McKenzie, Alexander, M.A., D.Sc. (St. Andrews), Ph.D. (Berlin), F.R.S., University College, Dundee.
- Rose, Sir Thomas Kirke, A.R.S.M., D.Sc. (Lond.), Royal Mint, London, E.; and Ashdown, Northwood, Middlesex.
- Spencer, James Frederick, D.Sc. (Liverpool), Ph.D. (Breslau), 25, Bishop's Road, Highgate, London, N.
- Vlies, Leonard Ellerton, Belmont, Gowan Road, Alexandra Park, Manchester.
- Walker, Professor James, D.Sc. (Edin.), Ph.D. (Leipzig), F.R.S., 5, Wester Coates Road, Edinburgh.
- Wood, James, M.A., B.Sc. (Aberd.), 41, Rock Park, Rock Ferry, Cheshire.

Associates Elected to the Fellowship.

- Atack, Frederick William, B.Sc. (Lond.), M.Sc. Tech. (Manc.), Assoc.M.S.T.,
88, Claude Road, Chorltonville, Manchester ; and School of Technology,
Manchester.
- Berry, Leslie Hamilton, B.Sc. (Lond.), Gbangbama, Imperii sub District,
viâ Moyamba, Sierra Leone.
- Carruthers, George MacLellan, 7, Mitchell Drive, High Crosshill, Rutherglen,
Scotland.
- Conyers, Fred Gofton, Staveley, Leake Street, Castleford, Yorks.
- Drinkwater, Basil Walter, B.Sc., A.R.S.M., A.R.C.S. (Lond.), St. Margaret's,
Wallington, Surrey.
- Eastburn, Gerald Jerome, Towerville, Helensburgh, Scotland.
- Hinton, Cyril Langley, 5, Vine Street, Romford, Essex.
- King, James Grieve, 70, Ardrossan Road, Salteoats, Ayrshire.
- Norris, Roland Victor, M.Sc. (Manc.), c/o Mrs. Norris, Lister Institute,
Chelsea Gardens, S.W.
- Potter, Francis Martin, B.Sc., A.R.C.S. (Lond.), H.M. Factory, Penrhyn-
deudraeth, N. Wales.
- Scholefield, Fred, M.Sc. (Viet.), B.Sc. (Lond. and Leeds), c/o Messrs.
Burgess Ledward & Co., Ltd. (Dyehouse Department), Walkden,
Manchester.
- Thompson, Miss Gartha, B.Sc. (Lond.), 15, Mall Road, Hammersmith,
London, W.
- Walker, Frederick George Cannon, 142, Highgate, Kendal, Westmorland.

New Associates.

- Brannigan, Peter Joseph, M.Sc. (Q.U.B.), 137, Springfield Road, Belfast.
- Cox, Henry Edward, B.Sc. (Lond.), 451, Glossop Road, Sheffield.
- Hopkins, Thomas, B.Sc. (Lond. and Wales), c/o Messrs. Nobel's Explosives
Co., Ardeer, Scotland.
- Macintyre, Ernest Gunn, B.Sc. (Glas.), 221, Langside Road, Glasgow.
- Madden, Denis, A.R.C.S.I., 40, Wellington Road, St. Luke's, Cork.
- McEwan, Thomas Lawson, B.Sc. (St. Andrews), 116, Wimbledon Park
Road, Southfields, London, S.W.
- Ogilvie, James, B.Sc. (Edin.), 368, Easter Road, Leith, Scotland.
- Stewart, Andrew, B.Sc. (Glas.), 111, Petershill Road, Glasgow.
- Wells, Ernest Edmund, B.Sc. (Lond.), 35, Sibthorpe Street, Lincoln.

New Students.

- Baines, Edward Robinson, 99, Eastgate, Louth, Lincs.
- Boyd, William John, Oakfield, Salteoats, Scotland.
- Branson, Frederick Hartridge, 13, Briggate, Leeds.
- Bright, John Harold, Thornbury, Birmingham Road, West Bromwich.
- Corby, Frederick James, 102, Birmingham Road, Walsall.

Coutie, Alexander, 17, West Preston Street, Edinburgh.

Cunliffe, Percy Walmsley, 73, Waddington Road, Clitheroe, Lanes.

Day, Frank, 38, Cranfield Road, Brockley, London, S.E.

Eastman, William Vivaish, 27, Dudley Road, Church End, Finchley, London, N.

Francis, Arthur Clarence, 316, Morningside Road, Edinburgh.

Hedgecock, Stuart William, 14, Kingshall Road, Beckenham, Kent.

Hocking, Frederick Denison Maurice, 18, Woodside Park Road, North Finchley, London, N.

Kitson, Joe, Wallroyds, Denby Dale.

Parsons, Arthur Edwin, 12, Clarendon Road, Leytonstone, Essex.

Smith, Alexander M., 13, Viewforth Gardens, Edinburgh.

Smith, James Salsbury, The Winnotts, Darley Dale, near Matlock, Derbyshire.

Winbolt, Eric Archer, 4, The Avenue, Christ's Hospital, West Horsham, Sussex.

Wilson, Donald Cuming, 5, Hope Place, Tranent, East Lothian, Scotland.

DEATHS.

Fellows.

Dickinson, Arthur John.

Glover, George Thomas.

Hanbury, Cornelius.

Jackson, Edward.

Macdougald, George Duncan.

Ramsay, Sir William, K.C.B., LL.D., D.Sc., F.R.S.

Stoddart, Frederick Wallis.

Wheelwright, Edwin Whitfield, M.A. (Oxon.), Ph.D. (Munich).

Students.

Bishop, John Edmund, Captain 10th Battalion East Lancashire Regiment. (Killed in action.)

Boyd, Gavin, 2nd Lieut. R.E. (Killed in action.)

Islip, Harold Thomas, Corporal R.E. (Killed in action.)

Mitchell, David.

General Notices.

Examination in Biological Chemistry, Bacteriology, Fermentation and Enzyme Action :

October, 1916.

An examination in Biological Chemistry, Bacteriology, etc., will commence on Monday, October 23rd, 1916.

This examination will be open to Fellows and Associates, to candidates whose applications for admission to the Final Examination have been accepted by the Council, and to candidates who have passed the Intermediate Examination of the Institute, provided in each case that they produce evidence, satisfactory to the Council, of having taken a course in Elementary Biology, as defined in the Regulations.

The examination extends over five days and may be theoretical and practical, written and oral. The syllabus includes Biological Chemistry, Bacteriology, Fermentation and Enzyme Action, with special reference to the Chemistry and Bacteriology of Food Stuffs, Water Supply and Sewage Disposal, and the application of Biological Chemistry to Industries and Manufactures.

The list of candidates for this examination will close on Tuesday, September 12th, 1916.

Candidates intending to enter for this examination are recommended to study the following subjects :—

The morphology, physiology, and life history of bacteria, yeasts, and moulds, in their relation to food, water supply, the treatment of sewage, agriculture, and the fermentation industries. (*A special study of pathogenic organisms is not demanded, but the candidate should acquire a knowledge of such as are of importance in relation to food and to water supply.*) Enzymes and their actions. The proteins and their decomposition products. The methods employed in the examination and estimation of the

carbo-hydrates. The chemistry of waters, sewage liquors and effluents. The chemistry of brewing and other fermentation industries. Practical work should include :—(a) general bacteriological methods and preparation of pure cultures; (b) microscopy: the staining and mounting of preparations, and the recognition of species; (c) changes caused by micro-organisms.

Candidates are also advised to use every opportunity of becoming practically acquainted with the various technical problems which are dependent for their solution on a knowledge of Biological Chemistry, and to supplement their reading by visits to works such as breweries, dairies, tanneries, sewage works and water works. As very few courses in biology or botany include any reference to the commoner organisms occurring in water and sewage, students are recommended to make their own observations in those departments of biological investigation.

Examinations in Chemical Technology, October, 1916.—The Chemical Technology Examination Board will be prepared to hold an examination in October next. The exact date will be announced later.

The list of Candidates will close on Tuesday, September 12th, 1916.

Full information can be obtained from the Registrar.

Notice to Associates.—Associates elected prior to June, 1913, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry for at least three years since their election to the Associateship, can obtain forms of application for election to the Fellowship.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in securing appointments for qualified chemists.

The Laboratories.—The Laboratories of the Institute of Chemistry are available for the use of other Institutions for examination purposes, on terms to be obtained from the Registrar.

The Library.—The Library is open for the use of Fellows, Associates and Registered Students, between the hours of 10 A.M. and 6 P.M. on week-days (Saturdays: 10 A.M. to 2 P.M.), except when examinations are being held.

PRESENT POSITION OF THE BUILDING FUND.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Contributions ...	16,623	1	0	Site, Building and equipment costs to date ...	19,406	7	3
Dividends and Interest ...	1,149	10	1	Investments, including Commission...	4,806	11	0
Realisation of Investments ...	4,557	9	7	Interest on Loans...	61	8	8
Loans ...	1,982	10	2	Balance at Bank, 25th July, 1916...	38	3	11
	<u>£24,312</u>	<u>10</u>	<u>10</u>		<u>£24,312</u>	<u>10</u>	<u>10</u>
ASSETS.				LIABILITIES.			
	£	s.	d.		£	s.	d.
Balance at Bank, 25th July, 1916...	38	3	11	Loans ...	1,982	10	2
Legacy from the late Edward Riley, Esq., F.I.C. ...	1,000	0	0	Outstanding accounts estimated at... ..	1,454	7	5
Outstanding Promises ...	538	8	0	Interest on Loans...	10	0	0
Approximate amount yet required ...	3,145	5	8	Further equipment and furniture ...	1,275	0	0
	<u>£4,721</u>	<u>17</u>	<u>7</u>		<u>£4,721</u>	<u>17</u>	<u>7</u>

30, RUSSELL SQUARE,
LONDON, W.C.
25th July, 1916.



THE
INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

FOUNDED, 1877.
INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,
1916.

PART IV.

PROCEEDINGS OF THE COUNCIL (JULY—OCTOBER, 1916).
ABSTRACT OF THE REPORT OF THE ADVISORY COUNCIL ON
SCIENTIFIC AND INDUSTRIAL RESEARCH.
OBITUARY.
ABSTRACTS OF THE REPORT OF THE EXAMINERS,
OCTOBER, 1916.
WITH THE FORCES. (SUPPLEMENTARY LIST.)
THE REGISTER.
NOTICES: JANUARY EXAMINATIONS; APPOINTMENTS
REGISTER; NOTICE TO ASSOCIATES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary.

30, RUSSELL SQUARE, LONDON, W.C.,
November, 1916.

Proceedings Committee, 1916-17.

HORATIO BALLANTYNE (*Chairman*), .

SIR JAMES J. DOBBIE (*President*).

EDWARD J. BEVAN,

M. O. FORSTER,

ALEXANDER LAUDER,

H. R. LE SUEUR,

D. NORTHALL-LAURIE,

P. A. ELLIS RICHARDS,

W. H. ROBERTS,

W. LINCOLNE SUTTON,

THOMAS TICKLE

Proceedings of the Council.

JULY—OCTOBER, 1916.

Glass Research.— Since the publication of Proceedings, Part III., Professor Jackson has reported on the following formulas :—

- (XVIII.) 34. A further modification of "shell" glass. (Alternative to (IX.) 25 and (XIV.) 30.) Communicated to the Edinburgh and Leith Flint Glass Co.
- (XIX.) 35. Uranium glass showing strong fluorescence. —Communicated to Messrs. Wood Bros. Glass Co., Ltd.
- (XX.) 36. Three further opal glasses of different quality, allowing for the use of other constituents with economical results.—Communicated to the Ministry of Munitions, Messrs. Wood Bros. Glass Co., Ltd., and The Edinburgh and Leith Flint Glass Co.
- (XXI.) 37. Improved alternative formula for the glass for the lens of an artificial human eye.—Communicated to the Edinburgh and Leith Flint Glass Co.
- (XXII.) 38. Glass suitable for highly resistant lamp chimneys. Communicated to the Ministry of Munitions.
- (XXIII.) 39. Lead Glass as an alternative for the miners' lamp glass.—Communicated to the Ministry of Munitions.

The exhibition of British laboratory glassware and other requirements held at the Institute during August and September was visited by a large number of professional chemists, engineers, pharmacists and others. Most of the exhibits are still on view in the Library and Council Room.

The following firms exhibited :—

- Messrs. Ackroyd and Best, Ltd. (miners' lamp glasses).
- Messrs Baird and Tatlock (London) Ltd. (laboratory glassware).
- Messrs. W. and R. Balston, Ltd. (filter paper).
- The British Laboratory Ware Association, Ltd. (laboratory glassware).

Messrs. Doulton and Co., Ltd. (laboratory porcelain ware).

The Edinburgh and Leith Flint Glass Co. (tubing, X-ray bulbs, electric lamps, glass for ampoules, glass for artificial eyes, etc.).

Messrs. John Moncrieff, Ltd. (laboratory glassware).

Messrs. James Powell and Son (thermometer tubing).

Messrs. Frank Tomey and Co., Ltd. (thermometer tubing).

Messrs. Wood Bros. Glass Co., Ltd. (laboratory glassware).

The Worcester Porcelain Co., Ltd. (laboratory porcelain ware).

The variety and quality of the exhibits exemplify the results achieved by the co-operation of manufacturers and chemists in the establishment of these branches of industry and reflect credit on the enterprising firms concerned. Many technical difficulties have been surmounted and it may be anticipated that in the near future the prices as well as the quality will compare favourably with those of German and Austrian chemical glassware.

The British Science Guild has ascertained that 71 per cent. of the Public Schools and many of the Universities, technical institutions and secondary schools have undertaken not to purchase foreign chemical ware for a period of three years after the war, provided that an adequate supply of British manufacture is forthcoming at a price that is not prohibitive, and there is every reason to expect that practically all British users of such apparatus will support the manufacturers who have come to their aid during the present crisis, in order that these important key industries may become firmly established in this country.

The porcelain ware is showing steady improvement, the exhibits comprising a large variety of apparatus. Filter papers produced by various firms have proved highly satisfactory.

The Glass Research Committee are considering the formu-

lation of a method to be adopted for testing glass for laboratory use and will report to the Council on the matter in due course.

A schedule of the formulas up to and inclusive of (XXI.) 37, with particulars of the firms to whom they have been communicated, was published in the issue of *The Engineer* for September 22nd, 1916. A similar schedule was communicated in July to the Society of Chemical Industry and appeared in the Journal of the Society. A short introduction with regard to the British-made chemical glassware exhibits was contributed to the catalogue of the exhibition held by the Society in Edinburgh in the same month. A report with regard to the Exhibition held by the Institute has been communicated to the British Science Guild for inclusion in the Journal of the Guild.

Statements of the laboratory glass and optical glass research accounts, respectively, to the 1st October, 1916, have been submitted to the Advisory Council, showing that of the grant of £500 for optical glass research the Committee had in hand at that date a balance of approximately £225, and of the grant of £400 for laboratory glass research there remained a balance of approximately £270. These figures are exclusive of the further grants agreed to be made from the funds of the Institute for these purposes.

Clay Research.—Professor Jackson is continuing the research on clay for the Ministry of Munitions, the reports for the present being communicated only to the Optical and Glassware Munitions Department.

Hard Porcelain.—Although the question of hard porcelain lies outside the reference to the Glass Research Committee, a considerable amount of attention has been given to the matter, and samples of British-made basins and crucibles have been examined from time to time by various members of the Committee. The reports received indicate that considerable progress in the improvement of the quality of these productions has been made, and it is hoped that the problems involved may be entirely successfully met in the near future.

Professional Chemists and the War.—Owing to the demand for the services of chemists in the production of munitions, the authorities concerned have withdrawn from the Army a considerable number of those possessing recognised diplomas and degrees, and particularly such as have had experience in industrial work. The Institute continues to maintain for the assistance of the authorities a special Register, available to all British chemists. Those who have had control of plant and manufacturing operations or who have been engaged on research, and are in a position to offer their services in any way for work connected with the prosecution of the war, are urged to communicate with the Registrar. Students and others with less advanced chemical training who are liable for military service are also invited to make inquiries at the Institute before they are called up for enlistment.

Advertisements have recently appeared in the daily and technical press inviting qualified technical and research chemists to apply for positions in controlled establishments engaged in the supply of war material, the advertisements concluding with the words: "Apply your nearest Labour Exchange, mentioning this newspaper and No. —"

As it seemed that few chemists were likely to answer the advertisements in the form referred to, and the managers of controlled works felt that they did not receive adequate response to their announcements, the Council have brought the matter to the notice of the Department of Explosives Supply and have expressed the hope that the method of inviting applications would be amended so that candidates might be brought into immediate touch with the duly constituted Staff Bureau of the Ministry or with the principals of the controlled establishments.

In view of the fact that many letters have been received concerning the enlistment of professional chemists with the Forces, the following information is reproduced from the List of Certified Occupations (R. 105), published on November 20th:—

Under General Reservations, provision is made for the

exemption of Works Chemists of twenty-five years and over, and a footnote states that where the works chemist at important works is under twenty-five and is the only man left in that position he should be treated as in a certified occupation.

Under Reservations in Particular Trades,—Analytical, consulting or research chemists are to be treated as in a certified occupation if recommended by the Royal Society. Chemists engaged in chemical trades, or in dyestuff (natural or artificial) manufacture, are to be treated as in a certified occupation, and analytical chemists engaged with wholesale manufacturing druggists are to be so treated if of the age of thirty or upwards.

In a notice appearing in the front part of the List it is stated that the reservations will be reduced early in 1917 by a further raising of the age limits, especially in the trades not mainly engaged on Government work.

Members and Registered Students serving with the Forces are welcome at the Institute when they are in London, and will be provided with light refreshment at all convenient times.

The Building Fund.—The Council have the pleasure to report an improvement in the position of the Building Fund. The summary on p. 42 indicates that the contributions received since the publication of Proceedings, Part III., have increased by the sum of £766 *gs.* The Council have conveyed their thanks to the donors and to Fellows and Associates who have brought the appeal to the notice of companies and firms interested in the science of chemistry and its practical applications. Copies of an illustrated pamphlet, giving particulars of the building and the list of contributors, will be sent to any member who may be able to render similar assistance. A further sum of about £2,500 is yet required to clear off all liabilities and to complete the furnishing and equipment of the building.

Regulations.—Having in view the desirability of promoting the further organisation of the profession of chemistry and of making the Institute more completely representative of the profession, the Council consider it expedient to bring into operation as early as possible certain new Regulations for the admission of Fellows and Associates.

The Council would remind the Members of the proposals referred to in the Annual Report for 1914-15, Proceedings, Part I., 1915, which have been reconsidered and amended in the light of the conditions resulting from the war. It was intended to submit the alterations originally proposed to an Extraordinary General Meeting, but in view of the fact that a large proportion of the Fellows and Associates is engaged with the Forces or in the service of the country in various capacities, the Council are of opinion that the views of the members can be best secured by issuing a circular giving particulars of the proposed changes, and by inviting the comments of the members thereon. A circular dealing with the matter has, therefore, been issued with this Part of the Proceedings.

Special provision has been made for the admission of trained chemists who have been prevented by the prevailing conditions from taking the Examinations. These provisions also meet the general desire to avoid the imposition of unnecessary examinations on Candidates who have obtained degrees with First or Second Class Honours in Chemistry or other degrees or diplomas recognised by the Council as equivalent.

In view of the objects to be attained, the Council hope that the proposals will be acceptable to the Fellows and Associates, to whom they look for co-operation and assistance in bringing the new Regulations, when finally adjusted, to the notice of eligible candidates. In the consideration of applications every care will be taken to safeguard the interests of existing members and to ensure that the standards of efficiency which the Fellowship and Associateship represent shall be fully maintained.

The replies received will be submitted to careful con-

sideration by the Council, who, acting under the powers conferred upon them by the Charter, will proceed to formulate the new regulations and bring them into operation with as little delay as possible.

The Council request that all Fellows and Associates who wish to express their views on the proposals will communicate them to the Registrar before March 1st next,

An outline of the proposed new Regulations is here reproduced:—

ABSTRACT OF THE TRAINING AND QUALIFICATIONS FOR THE ASSOCIATESHIP.

A Candidate may proceed to the Associateship under either Regulations A or B, which are alternative.

A.

1. An approved Preliminary Examination of Matriculation standard.

2. (a) Four years' day training at a recognised University or College, with satisfactory evidence of having passed the class examinations in the necessary subjects;

or, (b) three years' such training, with satisfactory evidence of having passed the class examinations, and two years' experience under a Fellow of the Institute in a laboratory approved by the Council;

or, (c) a degree in Chemistry and Physics taken at a recognised University with, in the case of pass graduates, a subsequent year's training in Chemistry at a recognised University or College, or two years' experience under a Fellow of the Institute in a laboratory approved by the Council;

provided in every case that the Candidate has produced satisfactory evidence of training in Physics and Mathematics.

3. An Examination in *general* theoretical and practical Chemistry for the Associateship, conducted by the Institute.

B.

A degree with First or Second Class Honours in Chemistry, or other degree or diploma recognised by the Council as equivalent, obtained after a three years' day course, with three years' subsequent experience of a standard and character approved by the Council;

or, a Degree with First or Second Class Honours in Chemistry, or other degree or diploma regarded by the Council as equivalent, obtained after a four year's day course, with two years' subsequent experience of a standard and character approved by the Council;

provided in every case that the Candidate has produced satisfactory evidence of training in Physics and Mathematics.

(The Candidate cannot in any case be elected an Associate unless he has attained the age of 21 years.)

QUALIFICATIONS FOR THE FELLOWSHIP.

Three years' continuous occupation (to the satisfaction of the Council) in the study and practical work of applied chemistry since admission to the Associateship, and either the production of records of original research of sufficient merit in the opinion of the Council, or of the devising of processes or inventions of sufficient merit in the opinion of the Council, or the production of evidence of knowledge and ability which, in the opinion of the Council, is equivalent to fulfilling the conditions hereinbefore contained :

or, three years' continuous occupation (as above) and the passing of an examination in a special branch, similar to the Final (A.I.C.) Examination at present held, but specially conducted for the purpose of ascertaining the fitness of the Candidate to cope with any problem liable to occur in the branch of practice corresponding with the branch selected, the Candidate being required to show a good general knowledge of at least one branch of chemical practice.

The new Regulations will not in any way affect the powers of the Council to elect Fellows, in exceptional cases, under the provisions of Clause 5 of the Royal Charter ; nor will they affect the interests of existing Registered Students, who will have the option of proceeding to the Associateship and Fellowship by either the present or the new method ; nor the interests of existing Associates, who will be entitled to apply for admission to the Fellowship under the Regulations now in force.

The Board of Scientific Societies.—In Proceedings, Part III., reference was made to the establishment under the auspices of the Royal Society, of a Board of representatives of the principal scientific and professional societies, and to the appointment of Sir James Dobbie, President, and Professor Herbert Jackson, Vice-President as the representatives of the Institute on the Board.

The co-operation of the Council of the Institute has been invited in the consideration by the Board of matters relating to the production of the International Catalogue of Scientific Literature and to the teaching of science in secondary schools.

The Board has also invited the Councils of the affiliated Societies to submit for consideration questions relating to science, industry and education in which the Board might take action in the public interest.

Examinations.—The Council have received a report on the Examination held at Adelaide of one candidate for the Fellowship in the branch of Mineral Chemistry. The Examination was conducted under the supervision of Mr. W. A. Hargreaves, Government Analyst for South Australia. The candidate, Mr. Charles Eustace Chapman, satisfied the Board and has been duly elected a Fellow of the Institute.

The Council will shortly receive the report on the recent examination of a candidate who presented himself for examination in Biological Chemistry held in London (see p. 36).

Professional Interests.—The increasing public appreciation of the value of scientific method in industry has led to a tendency on the part of municipal and other authorities to encroach on the province of professional chemists, and the attention of the Institute has been directed to a number of matters in which the Council have found it necessary to take steps to represent the danger of discouraging individual practice. In one case an important municipal corporation determined to establish a laboratory to undertake analyses for the trades in the neighbourhood at nominal cost, but representations have been made, and it is hoped that the scheme will be considerably modified. In another case a protest has been lodged against the appointment of the members of the staff of a College to official positions under the Fertilisers and Feeding Stuffs Act, on the ground that the qualifications required for such appointments are of a personal character, and it is not the function of educational institutions, as such, to assist in the administration of the Act.

London Chamber of Commerce.—At the invitation of the London Chamber of Commerce, Mr. Edward Bevan and Dr. M. O. Forster, Vice-Presidents, and Mr. A. Gordon Salamon, Honorary Treasurer, attended, as representatives of the Institute, a meeting of the Chemical Trade Section of the Chamber held on October 27th, to discuss the general policy of the chemical and allied industries on practical

questions arising during and after the war and to consider what concerted action might be desirable in the common interest. Several months previously the Council of the Chamber had appointed a Special Committee to deal with such matters, who adopted and submitted the following recommendations:—

- (1) That any measure which may be considered in connection with trade during and after the war should provide: (a) for preferential reciprocal trading relations between all parts of the British Empire; (b) for reciprocal trading relations between the British Empire and the Allied countries; (c) for the favourable treatment of neutral countries; and (d) for regulating, by tariffs and otherwise, trade relations with all enemy countries, so as to render impossible a return to pre-war conditions, and for stimulating the development of home manufactures and the consequent increased employment of native labour.
- (2) That steps should be taken to prevent the dumping (and undervaluation) of enemy goods into British markets after the war.

Mr. Thomas Tyrer was Chairman of the Meeting, at which consideration was given to such subjects as freights, tariffs and other protective measures, consular service, the development of economic resources and parliamentary representation of the chemical industry. The Meeting unanimously agreed that the questions raised in the discussion should be referred to the respective sub-sections for consideration and such action as might be practicable.

British Dyes, Limited.—In view of the interest shown by professional chemists in the endeavour which is being made to place the production of dyes on a satisfactory basis in this country and the opinions expressed by the late Professor Meldola in his Presidential Address at the Annual General Meeting in March, 1915, the Fellows and Associates will note with satisfaction that the organisation of British Dyes, Limited, includes chemists as members of its directorate and has the assistance of a Technical Committee and a Research Department in addition to an Advisory Council, consisting of twelve Professors of Chemistry. Pending the establishment of a Central Research Laboratory, it has been arranged that research, so far as not conducted in the works, shall be carried

on in the laboratories of different universities under the supervision of the professors of organic chemistry. Research colonies have thus been established and much important work has been done. The Advisory Council "has been formed for the purpose of increasing the number of chemists and promoting research in organic chemistry and particularly in that branch of it which relates to coal-tar colours. The Company have offered to place at the disposal of the Professors an annual grant for the remuneration of honours graduates in chemistry who have received special instruction in coal-tar products and who are prepared to continue their training as research assistants. After such training the Company will be prepared to offer employment to suitable men recommended by the Professors. The Directors have also agreed to make a grant of £5,000 towards a scheme for the development of advanced teaching and research in tinctorial chemistry in the Technical College at Huddersfield."

The late Professor Meldola. Fellows and Associates will be interested to hear of the publication of a book entitled "Raphael Meldola: Reminiscences of his Worth and Work." The book, which is edited by Mr. James Marchant, contains a preface by Lord Moulton and contributions from chemists (including Sir William Tilden, Dr. M. O. Forster, Professor W. J. Pope, Professor Arthur G. Green, Sir Edward Thorpe and Sir Alexander Pedley), naturalists, astronomers and personal friends. It contains also a chronological list of Professor Meldola's publications prepared by Professor E. B. Poulton. A copy has been received from the publishers, Messrs. Williams and Norgate, and can be seen in the Library. The profits of the production will be placed at the disposal of Mrs. Meldola for charitable purposes.

Death of Sir William Ramsay, K.C.B., F.R.S.—
The news of the death of Sir William Ramsay was received when Proceedings, Part III., was just being sent to press.

The Council greatly deplore this loss to British chemistry. Sir William Ramsay had always taken a keen interest in the

Institute: he was an Original Fellow, an Examiner from 1883 to 1887, a Member of Council for three periods, a Vice-President, and a Censor for two periods. (See p. 33.)

Death of Mr. Bedford McNeill.—The Council record with much regret the death of Mr. Bedford McNeill, who was elected a Member of Council at the Annual General Meeting held on March 1st, 1916. (See p. 32.)

Election of a Member of Council.—Mr. Charles Olden Bannister, A.R.S.M., has been elected to the vacancy on the Council caused by the death of Mr. McNeill.

Gifts.—The thanks of the Council have been accorded to Mrs. Meldola for a handsome long-case clock which she has presented to the Institute in memory of her husband. The clock was made by Thomas Wightman, of George Yard, London, about 1780.

Thanks have been accorded also to Mr. A. Gordon Salamon, Honorary Treasurer, for the gift of a bronze statuette of Pasteur, by Théodore-Rivière.

Both gifts have been placed in the Council Room.

Death of Mr. David Howard, Past-President 1903—1906.—The Council record with deep regret the death of Mr. David Howard, who had been actively associated with the work of the Institute throughout its history. Mr. Howard was an Original Fellow, a Member of the first Council, Treasurer for eighteen years, President for three years, and Vice-President for three years. He was also a Censor for several periods, in all twenty-four years, and held office as such at the time of his death, which occurred, suddenly, on November 14th, 1916. A record of Mr. Howard's career will be prepared for inclusion in Proceedings, Part I., 1917.

Scientific and Industrial Research.

The Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16 (Cd. 8336), published in August last, consists mainly of a Report from the Advisory Council constituted on July 28th, 1915. The Report is of such importance to the chemical profession that it is deemed desirable to give a fairly full abstract.

Under the terms of the appointment of the Advisory Council, proposals are referred, for their report and recommendation,

- “ (i.) for instituting specific researches ;
- “ (ii.) for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades ; and
- “ (iii.) for the establishment and award of Research Studentships and Fellowships.

“ The said Council may itself initiate such proposals and may advise the Committee on such matters, whether general or particular, relating to the advancement of trade and industry by means of scientific research as the Committee from time to time determine.”

After reviewing the previous Government action in the present century—including the establishment of the National Physical Laboratory, the appointment of the Engineering Standards Committee, the reconstitution of the Imperial Institute, and the foundation of the Imperial College of Science and Technology—the Advisory Council indicate that other machinery and additional State assistance is necessary in order to promote and organise scientific research

with a view to its practical application to trade and industry. Reference is made to the appointment in August, 1914, of the Chemical Products Committee of the Board of Trade, to the support given by the Treasury to British Dyes Limited, and also to the representations made by the Royal Society and other societies interested in chemistry to the Presidents of the Boards of Trade and Education, which were followed by the appointment of the Advisory Council as an integral part of a comprehensive scheme for improving our educational system. "The State had thus recognised the necessity for organising the national brain power in the interests of the nation at peace. The necessity for the central control of our machinery for war had been obvious for centuries, but the essential unity of the knowledge which supports both the military and industrial efforts of the country was not generally understood until the present war revealed it in so many directions as to bring it home to all. War has remained as much an art as ever, but its instruments, originally the work of the craftsman and the artist, are now not only forged by the man of science; they need a scientific training for their effective use. This is equally true of the weapons of industry. The brains, even the very processes, that to-day are necessary to the output of munitions were yesterday needed, and will be needed again to-morrow, for the arts of peace.

"It has been questioned whether it would not have been wiser to avoid the inevitable difficulties resulting from the war by postponing action until peace was restored, but Mr. Henderson"—then President of the Board of Education—"foresaw this criticism and pointed out that 'we cannot hope to improvise an effective system at the moment when hostilities cease, and unless during the present period we are able to make a substantial advance we shall certainly be unable to do what is necessary in the equally difficult period of reconstruction which will follow the war.' The Advisory Council were therefore directed 'to frame a programme for their own guidance in recommending proposals for research and for the guidance of the Committee of

Council in allocating such State funds as may be available.' This scheme will naturally be designed to operate over some years in advance, and in framing it the Council must necessarily have due regard to the relative urgency of the problems requiring solution, the supply of trained researchers available for particular pieces of research, and the material facilities in the form of laboratories and equipment which are available or can be provided for specific researches. Such a scheme will naturally be elastic and will require modification from year to year; but it is obviously undesirable that the Council should live 'from hand to mouth' or work on the principle of 'first come first served,' and the recommendations (which for the purpose of estimating they will have to make annually to the Committee of Council) should represent progressive instalments of a considered programme and policy."

The Council have decided for the present to give preference in their deliberations to research of directly industrial application, particularly as the Universities, the natural homes of research in pure science, have been so depleted of both students and teachers by the war that they are barely able to continue their routine work. Inquiries led to information regarding researches, initiated by professional societies, which had been abandoned owing to the war, and grants were made to allow of their being continued. Conferences were held between the Chairman and Officers of the Council and the representatives of the principal learned and professional societies and industrial associations. In this connection, the remarks of the Council are here noted:—

"The engineering trades, with their attendant group of distinguished professional societies, have long been alive to the need and value of scientific research, while the chemical trades for the most part are so divided and individual in outlook that the various professional societies have had neither the influence nor the means necessary to enable them to take any large share in promoting research in connection with those industries. The textile trades, highly organised as they are on the economic side, had made even less progress in the

systematic use of science. They had been content for the most part to leave science to the dyers and the dye-stuff manufacturers, or to the engineers who supplied them with machinery, without much care in either case as to their nationality. The paper manufacturers were in much the same position. But now there are signs of a change, and already textile research into the electrification of fibres during manufacture is proceeding at the University of Leeds with funds provided by the Textile Institute, and proposals are before the Council for fundamental researches into the cellulose fibres which form the basic material of the cotton and paper trades."

The Council have also taken steps to form a register of researches which were actually being conducted on the outbreak of war and are making a careful survey in order to prepare a systematic programme of aid to individual researchers in educational institutions.

"It is hoped that the register will enable suitable workers to be rapidly found when proposals for special lines of inquiry come before the Council, and that a survey of the directions in which research is now proceeding in our Universities and Colleges may enable the Council to make helpful suggestions to individual workers from time to time, as the need for research in particular directions becomes apparent."

The Council "also have under consideration the possibility of inducing firms in some at least of our industries to assist the progress of research by informing us in confidence of the problems they have in hand or in contemplation. . . . Some manufacturers at any rate are beginning to realise that their most numerous and dangerous enemies are not their fellow-countrymen engaged in the same trade, but powerful combinations of manufacturers in other countries supported by every device of rate and tariff that their Governments can provide. We appreciate the difficulties involved in an attempt to systematise the interchange, between manufacturers, of knowledge and experience often purchased at great cost, or to proceed more rapidly than the best opinion would approve, or to anticipate those conditions in the home and foreign

markets which would make a pooling of knowledge advantageous. But broadly speaking we think that any assistance that the industries or even individual firms can give us, from their accumulated experience, in bringing science to bear rapidly upon manufacturing problems will be of benefit to the trade as a whole, and indirectly if not directly of advantage to each manufacturer. In the numerous conferences we have had with representatives of different industries we have been impressed with the spirit of co-operation which is growing up and the willingness to accept our suggestions for the initiation of research for the benefit of the trade as a whole. Co-operative research, when it has done its utmost, will always leave ample room for individual initiative and ability in the application of its results, more than sufficient as an incentive and as a means to outstanding success. Co-operation is not the negation of individual effort : it raises initiative to a higher power."

The authorities of Universities and Technical Colleges have been invited to consult "the heads of their several departments and to submit proposals, the Council making it clear that with the heads of the departments and not with the Senates or Faculties or other University authorities would rest the responsibility for the recommendations put forward. It was also explained that the Council would not recommend a grant in any case if in the result the funds of the University or College ordinarily available for teaching or research were relieved. This proviso was necessary because (a) the State was already aiding the general funds of the Universities and Technical Colleges through the several Education Departments and the Treasury ; (b) the intention was to increase the productivity of individual researchers ; and (c) it was important to avoid doing anything likely to diminish the flow of private benefactions for research. The responsible professors and teachers have in nearly every case exercised great care and discretion in making their proposals, and nothing could show in more lamentable and honourable clearness the service of the Universities to the country in the hour of her need than

the resulting list. The Board of Education and the Scotch Education Department had been able to retain with the concurrence of the military authorities a certain number of advanced students in Science, Technology, and Medicine, who were medically fit, because it had been foreseen that they would be required in the several national war services as they completed their studies. But all these and more than all these were needed, and from among the small remainder not taken for urgent scientific work the Council have only been able to recommend grants to some forty individuals, amounting in all to a sum not exceeding £6,000."

The Council regard research in pure science as being as much in their care as research in applied science ; but they think that as their relations with the Universities and Higher Technical Colleges grow closer they may be able to call the attention of both students and teachers to many interesting problems in industrial research, of which they will become aware in the course of their own work, and that individual members of the Council and their Standing Committees may come to be taken into counsel as to possible lines of research. If this hope is fulfilled they may help to encourage a better professional training for chemists, physicists, and other men of science. It is their desire so to order the relations of workers in pure science to the industries going on around them that they may receive the stimulus of a wider outlook than is always attainable under the limitations of an academic system of syllabus and examination.

It will be an additional assistance to the establishment of a clearing house for information bearing on research if the professional societies with industrial connections are encouraged to use the facilities offered by the Universities for research in a systematic way. The professional engineering societies have already established relations with the Universities, but, until recently, the Institute of Chemistry and the Society of Dyers and Colourists have probably been in closer connection with the profession or the industry than with the Universities and Technical Colleges. Links are, however,

being forged. The Institute of Chemistry in its work on glass has made a good beginning, and the Society of Dyers and Colourists is working out an interesting scheme under which it will form the natural connecting link between the manufacturer who has problems that need solution and the University or Technical College which may be able to solve them. We hope that similar developments may in due course take place in other scientific and professional societies."

"Three Standing Committees have already been set up: a Committee on Metallurgy under the chairmanship of Sir Gerard Muntz, Bart., with special sections for ferrous metallurgy under the chairmanship of Sir Robert Hadfield, and for non-ferrous metallurgy with Sir Gerard Muntz as Chairman; a Committee on Engineering under the chairmanship of Sir Maurice Fitzmaurice; and a Committee on Mining under the chairmanship of Sir William Garforth, with a Section on the mining of Iron, Coal and Hydrocarbons under the same chairmanship, and a Section on the mining of minerals other than Iron, Coal and Hydrocarbons, with Mr. Edgar Taylor as Chairman. . . .

"The terms of reference are as follows:—

"The Committee will meet from time to time and advise the Council on researches relating to Engineering or Mining or Metallurgy, as the case may be; and on such matters as may be referred to the Committee by the Advisory Council.

"Members of the Committee will also be invited to act as expert advisers in the formation of Special Committees of the Advisory Council to consider individual applications for grants in aid of Researches. In the formation of such Committees the Chairman of the Advisory Council will consult with the Chairman of the Committee or Section concerned and with those of its members who are specially conversant with the subject of the proposed research.

"The Council hope with the assistance of their Standing Committees, the Professional Societies, the Home Office and the Board of Trade gradually to construct panels of names which will enable them to obtain the very best advice on the different aspects of the problems they are called upon to solve. The advice they need may be commercial, economic, financial, or scientific. The best opinion in all these spheres will, it is

hoped, be available on the panels for the guidance of the Council and their Standing Committees, and will ensure the confidence of the industries concerned that the steps proposed have been considered in all their aspects.

"The number and scope of the Standing Committees will need extension from time to time. The organisation of the Council's machinery for dealing with the manifold chemical industries needs cautious handling in the first instance. Such questions as they have been able to approach have been referred to Special Committees of the Council itself. It seems unlikely that a single Chemical Committee, with the large number of special sections that would be necessary, could usefully be established at the present moment, and they are disposed to think that a series of Standing Committees dealing with particular branches of the chemical trades may be the better manner of proceeding."

The Report also includes a reference to the activities of various Societies, institutions and the Press in arousing greater interest in science and its practical applications and in promoting educational reform.

"The movement has not been confined to professors and to scientific men; the practical man of business, the manufacturer and the trader have been as anxious and interested as any. It is not to be wondered at, for they were the first upon whom the significance of a state of war was forced."

In this connection, the work of the Institute of Chemistry again comes under notice.

"In the early months of the war the great steel manufacturers were in grave danger from the possible exhaustion of the supply of chemical glass necessary for the testing of their materials and products. The consulting chemists were in the same case, and the Board of Education instituted a census of all the chemical glass available in the educational institutions of the country in view of the possible need for its requisition. The Institute of Chemistry accordingly set up a Glass Research Committee, under the late Professor Meldola, an original member of our Council, and so enabled Professor

Herbert Jackson to indicate the detailed process of manufacturing a number of special glasses, which were rapidly produced by progressive firms."

The Advisory Council acknowledge the work of Dr. Mellor, and also of Messrs. Doulton & Co., of Lambeth, and the Royal Worcester Porcelain Co., in the production of hard porcelain for chemical ware, and report that they have recommended a grant towards the extension and maintenance of the Stoke Pottery School.

The silk industry also has received attention ; a programme of research has been drawn up and problems are now being investigated at the Imperial College under the auspices of the Silk Association.

Other trade associations appear to be desirous of extending their functions so as to include the prosecution of research. Thus the newly formed Association of British Chemical Manufacturers includes in its objects the furtherance of industrial research.

The Council remark on the absence of Associations representative of many important trades. " There appear to be as yet no national Trade Associations for the organic chemical industries or for the heavy chemicals or for textiles, whether cotton or wool. . . . The functions of Trade Associations in this country are not as wide as those of similar Associations in Germany. The movements going on around us make it evident, however, that the difficulties of tradition, trade organisation, and national temperament, which stand in the way of combination and which extend far beyond the actual sphere of the Council's activities, must be squarely faced if progress is to be made, and must be dealt with as part of a comprehensive plan. . . .

" The Council have sometimes found that manufacturers were unwilling to try new developments because they appeared to lack any ambition for extension so long as their existing plant was fully occupied," but there are indications of a change of attitude. " The Scottish shale oil manufacturers who have hitherto been content with an individualistic policy . . . are

making arrangements for . . . research into some of the problems affecting their industry. The Federation of Master Printers have directed the attention of the Council to several substances used in their trade which the war had shown to be supplied solely by enemy countries, and which they urge should be investigated with a view to the creation of an independent source of supply. The whole position was discussed at a conference, and the Federation were sympathetic to the suggestion that the trade as a whole should endeavour to think out a plan for establishing some central institute for research and for the diffusion of advice to the trade, which might enable it not merely to make good leeway, but to draw ahead. There are also significant movements among the textile manufacturers of both Lancashire and Yorkshire. We think a good deal of the inertia which British manufacturers have shown towards research may have been due to a realisation, partly instinctive perhaps but partly based on experience, that research on the small scale they could afford, was at best a doubtful proposition."

The "Impediments to Industrial Research" are discussed—questions of expense, financing of new undertakings, the British Banking System, and so forth. Attention is directed to the recent "establishment by the Board of Trade of a Committee under the Chairmanship of Lord Faringdon 'to consider the best means of meeting the needs of British firms after the war as regards financial facilities for trade, particularly with reference to the financing of large overseas contracts, and to prepare a detailed scheme for the purpose.' . . .

"The Council have also repeatedly been told, when they have urged the necessity for expenditure upon research with a view to improvements and developments, that there is no security that new ventures will not be left, when peace comes, to shift for themselves as best they may in face of the highly organised competition of our enemies. We do not need to be convinced of the reality of the danger, but we are inclined to doubt the efficacy of any single device for removing it.

Organisation can only be fought by counter organisation, and so long as the Englishman treats his business house as his business castle, adding to its original plan here and there as necessity or inclination directs, with his hand against the hand of every other baron in his trade and no personal interest in the foreign politics of his industry as a whole, it will be as impossible for the State to save him, whether by research or other means, as it would have been for King Stephen to conduct a campaign abroad. In the main the State can only effectively help those who help themselves.

" It appears to be incontrovertible, however, that for those industries at least which are essential to the conduct of other important national activities and which are both scientific in their character and relatively small in bulk there is very little chance of survival unless special means are taken by the State to safeguard them. We are thinking of those scientific industries—sometimes called key or pivotal or master industries—which can never employ a large proportion of the population because the bulk of their products needed for the world's trade is inconsiderable; and yet without them many other trades would languish or die. Such industries are the magneto industry, the watchmaker's lathe industry, the optical glass industry, the chemical glass and porcelain industries, the fine chemical industry, the dye-stuff, synthetic drug and high explosives industries. . . . We do not necessarily endorse the view sometimes expressed that all key or pivotal industries should be artificially encouraged, by research grants or otherwise, to establish themselves in this country irrespective altogether of the natural disadvantages under which they might be carried on. The question is one of balancing the various considerations that arise. If a particular product is essential to the national safety the case for State action will be stronger than if it is not. If the trade to which the product is a 'key' is relatively unimportant the case will be relatively weak. . . . On the other hand, the argument based on natural disadvantages must not be pressed too hard in dealing with the scientific industries, for

these industries undoubtedly show a tendency to arise and flourish in those places in which the processes used in the industry were developed. Moreover, it is undoubtedly a misfortune for the industrial life of a country as a whole if a fair proportion of the most highly scientific trades is not included among its industries. The general tone and spirit of its manufacture is liable thereby to be lowered, for the best scientific men will not find openings in manufacture, and the status of the industrial man of science will tend to fall. We think, therefore, that it may be desirable for the State to take special pains to encourage those scientific industries which are recognised to be essential to the national well-being, and that accordingly the State may be well-advised to assume a greater responsibility for the cost of the necessary research for these industries than would in ordinary cases be admissible. . . .

"The Council are also persuaded that if a healthy condition of inquiry is to be fostered in the scientific industries, they must for some time to come expend a good deal of attention and money upon convincing the manufacturing world in general that scientific research is a paying proposition. They believe that the shortest means to this end is an attack upon the pressing problems of manufacture which arise in the course of the ordinary routine problems which the manufacturers ought, no doubt, to solve by means of their own scientific staffs, but which their present staffs are too small to undertake, often because the firms are too small to bear the necessary cost. . . .

"Indeed, we recognise fully that unless the generality of British firms can be induced to alter their present attitude we shall have failed profoundly in one of our appointed tasks."

The Council announce their intention to publish a series of pamphlets dealing with the promotion of industrial research in America, and with similar subjects, showing that "if a manufacturer has the necessary capital and has once realised the value of research, he needs no encouragement to con-

tinue. . . . But in other cases we believe the best procedure will be to demonstrate the value of research to industry by carefully selected object-lessons, and by the periodical issue of the pamphlets which will contain accounts of what has actually been accomplished and what needs doing in this field. In course of time we may hope to be able to abandon these missionary efforts and leave more time and money available for the big national problems that lie ahead."

In a paragraph dealing with American and German practice, information is given indicating that associated companies in America have established research laboratories for their common benefit and that manufacturers have established arrangements with Universities, under which advanced students may carry out investigations for manufacturers which may form the basis of research for the doctor's degree. "Both schemes are said to be working well, though it is too soon to draw any certain conclusions. Research undertaken exclusively for the benefit of one among a number of competing firms either by a public institution or at the cost of the State is indeed always likely to give rise to difficulties. Universities and public Research Institutes are maintained by endowments and public funds for the common good, and any arrangement which gives exclusive rights or benefits to a single firm as against others in the same industry is not easy to reconcile with the public advantage."

The Advisory Council have been unable to confirm the suggestion that in Germany the Government subsidises industry from public funds, except only in the case of the Jena glass industry, for the assistance of which the firm of Schott is said to have received a grant of £10,000 from the Prussian Government; but this case is regarded as exceptional, as Schott was at that time the only firm in Germany making optical glass.

Dealing with the sphere of the Universities and Technical Colleges in the application of science to industry, the Council state that "The Universities can and must be the main sources of research in pure science, the discoveries in which lie at the

root of all practical and technical applications ; " but that " Until our Universities are in the position to offer appointments which carry with them real freedom from financial anxiety, it is certain that their teachers will not, because they cannot, take the leading part which they should in the national contributions to knowledge. If the Universities can do their full share of the new work in pure science they will do much, but they can do more. They can also with their existing organisation assist smaller firms and less important industries to solve the problems immediately in front of them, and they can, no doubt, attack those fundamental problems of research in applied science which are not too complex or too extended in their nature." Attention is then directed to the existence, in Universities and Colleges, of technological departments closely related to industries. " The metallurgical department at Sheffield, the departments of tinctorial chemistry and of leather at Leeds, the engineering departments of the Royal Technical College, Glasgow, the departments of economic botany and of engineering at the Imperial College, the departments of mining and of brewing at Birmingham are obvious examples." The Council " believe that the present organisation of such departments will need modification and development if they are successfully to carry the burden that will be put on them."

Reference is made to the research activities affecting the interests of the Governments of the Empire, the work of the Royal Society, the National Physical Laboratory, the Imperial Institute and the Imperial College of Science and Technology, and to the steps being taken towards the establishment of a National Research Institute in Australia and similar organisations for the promotion of research in Canada, New Zealand and India. The Advisory Council have also been urged to consider the desirability of instituting a central clearing house of information as to research, which, subject to the approval of the Committee of the Privy Council, they hope to supply.

In this connection they consider it probable that " one of

the first and most necessary preliminaries to joint research in the stricter sense will be found to be the making of a systematic survey of the mineral and other resources of the Empire." On this point they remark: "We are disposed to think that no machinery less independent than that of a Government office would suffice, but the whole question will doubtless be considered by the Committee under the Chairmanship of Lord Balfour of Burleigh, appointed by the Prime Minister to consider the commercial and industrial policy to be adopted after the war, with special reference to the conclusions reached at the Economic Conference of the Allies, and to a number of other questions, among which are:—to what extent and by what means the resources of the Empire can be developed; and to what extent and by what means the sources of supply within the Empire can be prevented from falling under foreign control."

In the conclusion to their Report the Advisory Committee summarise the conditions necessary for the success of their work: "First, a largely increased supply of competent researchers; secondly, a hearty spirit of co-operation among all concerned, men of science, men of business, working men, professional and scientific Societies, Universities and Technical Colleges, Local Authorities and Government Departments."

A list of aided researches is given in Appendix III.

The Report is obtainable directly or through any bookseller from the usual Government Agents, price 3*d.*

Obituary.

JOHN ANGELL died at Manchester on September 9th, in his ninety-third year. His early training in science was obtained at the London Mechanics' Institution, in which he afterwards held a Lecturership for about two years, subsequently becoming private assistant for a similar period to Professor Thomas Graham at University College, whom he left to assist Mr. George Combe, of Edinburgh, in connection with a scheme for the introduction of science teaching into the curriculum of general education. In 1852 he was appointed Head of the Boys' School at the Salford Mechanics' Institute, and about five years later became organiser of the day and evening classes at the Manchester Mechanics' Institution. He resigned from this appointment in 1869 to accept the position of Senior Science Master at Manchester Grammar School, where he attained a high reputation as a teacher and remained for eighteen years. He was the author of text-books on magnetism and electricity and animal physiology, in Collins' Elementary Science Series. He was elected a Fellow of the Institute in 1878.

Lieut. JAMES DUNCAN ARCHIBALD, of the Essex Regiment, died on July 20th, from wounds received in action. He was a Registered Student of the Institute and at the outbreak of war was receiving his training at King's College, London.

PERCY CARTER BELL was the son of the late J. Carter Bell, A.R.S.M., F.I.C., and received his scientific training in the laboratory of his father and at Owens College (now the University), Manchester. He was engaged for about three years in assisting Dr. Edward Schunk in an investigation of some of the properties of the glucosides and in researches on chlorophyll and on colouring matters derived from madder; he also arranged and classified a considerable portion of the collection of mineralogical and geological specimens in Dr. Schunk's collection. From 1890 he held an appointment in Messrs. Frankenburg's rubber works at Salford and subsequently proceeded to America, where he engaged in various branches of chemical industry, ultimately establishing in New Jersey works for the manufacture of rubber substitute. He died at East Orange, New Jersey, on August 23rd. He was elected a Fellow of the Institute in 1892.

Second Lieut. GAVIN BOYD, a Registered Student of the Institute, was killed in action in France on July 13th in his twenty-seventh year. He was educated at Shawlands Academy, and proceeded to Glasgow University for his scientific training. He received a commission in the 14th Battalion of the Argyll and Sutherland Highlanders, but at the time of his death was serving with the Royal Engineers.

The Rev. Father JAMES CRAWFORD BREDIN, died in his fifty-second year. He received his training under Mr. Edward Davies (1879—84) and

Dr. A. J. Bernays, of St. Thomas's Hospital (1884—85). In 1886 he obtained an appointment as a Science Master at the High School, Roundhay, Leeds, and in 1888 was elected to the Associateship of the Institute. He held other teaching appointments in various Colleges until his death.

ARTHUR JOHN DICKINSON died at Lewisham on May 4th in his seventy-sixth year. He gained his experience in industrial chemistry in the alkali works of his uncle, Richard Smith, of Glasgow, where also he obtained experience in the preparation of aniline, and the manufacture of colours and dyers' chemicals, at the same time attending courses under Dr. Penny at Anderson's College. On leaving Glasgow he took charge for two years of the chemical laboratory of Messrs. Wright and Frances, where he superintended the preparation of photographic and medicinal chemicals, and in 1866 he established on his own account the Neptune Tar and Chemical Works at Deptford, which he conducted successfully until his death. He also erected other factories and was frequently consulted on matters connected with tar distillation. He was elected a Fellow of the Institute in 1880.

HAROLD EDWARD GRESHAM died at Birkenhead on July 23rd in his thirty-fourth year. He was educated at the Nottingham High School and received his scientific training at the local University College, taking the degree of B.Sc. (Lond.) in 1903 and the Associateship of the Institute in 1905. During the latter part of his training he was engaged in analytical work in the laboratory of Mr. S. R. Trotman, and in 1903 he received an appointment on the laboratory staff of the late Dr. J. Campbell Brown and Mr. W. Collingwood Williams at Liverpool. He was chief assistant to Mr. Williams, Public Analyst for Lancashire, at the time of his death. He was elected to the Fellowship of the Institute in 1909.

CORNELIUS HANBURY died at Berkhamsted on April 11th in his eighty-ninth year. Intending to practise medicine, he became a student at St. Bartholomew's Hospital; he also worked as a pupil-apprentice under Dr. (later Bishop) Callaway, and qualified as M.R.C.S. in 1849. In the following year, however, he entered the business of Messrs. William Allen, Hanburys and Barry, of Plough Court, Lombard Street, London, in which he became a partner six years later, and sole proprietor on the retirement of his cousin, Daniel Hanbury, in 1870. The business was subsequently registered as a limited liability company under his Chairmanship. He was Treasurer of the Pharmaceutical Society, from 1876 to 1878. He was an Original Fellow of the Institute.

EDWARD JACKSON died at Moseley, near Birmingham, on April 16th in his fifty-ninth year. Educated at a private school at Southport, he acquired his first experience in chemistry in the laboratory of an alkali works in that town, and later proceeded to Owens College, Manchester, where he worked under Roscoe and Schorlemmer. On leaving the College he was appointed chemist to Messrs. Wigg Bros. and Steel, at the Runcorn Soap and Alkali Works, with whom he remained until 1882, when he was appointed a Sub-Inspector under the new Alkali, etc., Works Regulation Act. He was engaged at first as assistant to Dr. Blatherwick in Scotland and later in the South Midland District, for which he became a full Inspector in 1894,

occupying that position until his death. He was elected a Fellow of the Institute in 1888.

ARTHUR GARFIELD LEVY died in New York on July 12th in his thirty-sixth year. He was born in America and educated partly in Germany before coming to England. He received his scientific training at Finsbury Technical College, qualified as an Associate of the Institute of Chemistry and took the degree of B.Sc. (Lond.), with honours. In 1899 he became assistant in the laboratory of Mr. Bertram Blount, with whom he remained for ten years, when he returned to the States and took a position with Professor H. M. Howe, in the Department of Metallurgy, School of Mines, Columbia University, New York. He was the author of many papers published in the *Analyst* and other journals, and was entrusted with the preparation of the second edition of Blount and Bloxam's "Chemistry for Engineers and Manufacturers." He was elected a Fellow of the Institute in 1905.

GEORGE DUNCAN MACDOUGALD died at Dundee on March 4th in his sixty-third year. He was born at Edinburgh and received his scientific training at the University where he worked first as a student and then as assistant to Dr. Lyon—afterwards Lord—Playfair and Professor A. Crum Brown. He also assisted Professor Dittmar in a number of researches. In 1874 he started a practice as a consulting and analytical chemist at Dundee, where he became public analyst for the Borough, and in the course of time held many other appointments under the Sale of Food and Drugs Acts and in connection with various agricultural and other associations. He was elected a Fellow of the Institute in 1879.

EDMUND GEORGE MCBRETNEY died at Newcastle-on-Tyne, on 26th June in his 65th year. He studied chemistry under Mr. George Ward at the Leeds Mechanics Institute—now the Technical School—and after being assistant to Mr. Thomas Fairley from 1883 to 1887, became chemist to Messrs. Biffitt and Co., Ltd., of the Aire and Calder Bottle Works. He may thus be regarded as a pioneer in the application of chemistry to glass bottle manufacture. During the session 1915—16 he was lecturer on glass technology at the Castleford Technical School, one of the centres established by Sheffield University in connection with the newly-formed Department of Glassmaking. He was elected a Fellow of the Institute in 1891.

BEDFORD MCNEILL died at Claygate, Surrey, on September 18th in his fifty-sixth year. In 1876 he entered the laboratory of Messrs. Chance Bros. & Co.'s Alkali Works at Oldbury, near Birmingham, where he worked for two years, attending during the same period the Birmingham and Midland Institute, where he obtained the first Priestley Scholarship. In 1878 he proceeded to the Royal School of Mines and two years later, on obtaining the Associateship of the School, became assistant to Mr. John Darlington, Civil and Mining Engineer, in the City of London, for whom he controlled an assay laboratory and was from time to time engaged in inspecting and reporting on mining properties in England, Germany, Transylvania and the United States. In 1897 he succeeded to the practice and became consultant to a number of important enterprises. His name is well known, especially in the engineering and mining industries, in connection with a telegraphic code, originally published in 1893, and now, extended and improved in a new edition published in 1908, in wide use throughout the

world. The code, which was the result of several years' hard work, reveals an intimate acquaintance with the details of mining operations and will no doubt long remain a memorial to the author. He was President of the Institution of Mining and Metallurgy in 1913-14 and was for several years Treasurer of the Geological Society. He was elected a Fellow of the Institute in 1888, and was a Member of the Council at the time of his death. He was buried at Hollington Church-in-the-Wood, near St. Leonards, and a wreath of flowers was forwarded as a tribute of esteem from the President and Council.

Lieut. JULIUS SEFTON PRINCE was killed in action at Loos on September 25th, 1915, in his twenty-fourth year. He received his general education in Germany and Switzerland and became registered as a student of the Institute under Mr. C. T. Bennett. At the time of his death he held a commission in the 7th Battalion of the London Regiment, having joined the London University O.T.C. before the outbreak of war.

WILLIAM RAMSAY was born in Glasgow on October 2nd, 1852, the only son of William Ramsay, Civil Engineer. Educated at Glasgow Academy, he matriculated at the University in his fourteenth year, and four years later proceeded to Germany, where he worked under Bunsen at Heidelberg, and afterwards under Fittig at Tübingen, where he obtained the degree of Ph.D. Returning to Glasgow in 1872, he was appointed an assistant in the Young laboratory of technical chemistry, and subsequently tutorial assistant in the University under Professor Ferguson. In 1880 he succeeded Professor Letts in the Chair of Chemistry at University College, Bristol, and the following year was appointed Principal of the College, where he remained for seven years, when he was appointed Professor of Chemistry at University College, London. In 1902 the Chemical Department of the College was reorganised and he became Professor of Inorganic Chemistry. He retired in 1913. He was the author of "A System of Inorganic Chemistry" (1891), of which there were several subsequent editions, "The Gases of the Atmosphere" (1896), of which there were also several editions, "Modern Chemistry" (1901), "Essays Biographical and Chemical" (1908); and was the editor of a valuable series of text-books of physical chemistry. His contributions to the journals of the chemical and other scientific societies both in this country and abroad were very numerous, and he took a prominent part in many matters of public interest. His researches covered practically every domain of chemistry, but he will be remembered especially for the discovery, simultaneously with Lord Rayleigh, of argon, in 1894, the isolation of helium, and the discovery, with Travers, of krypton, neon and xenon, in 1898. Soon after the discovery of radium by Madame Curie in 1902 he identified helium as a disintegration product of radium emanation. He was elected a Fellow of the Royal Society in 1888, received the Davy Medal of the Royal Society in 1895, and the Longstaff Medal of the Chemical Society in 1897. He was created a K.C.B. in 1902, was awarded the Nobel Prize for chemistry in 1904, and many foreign distinctions were conferred on him. He was President of the Society of Chemical Industry (1903-4), and of the Chemical Society (1907-9). He was an Original Fellow of the Institute of Chemistry. He died on July 23rd at his residence at Hazlemere, Bucks, in his sixty-fourth year and was buried at High Wycombe. The President attended the funeral as the representative of the Institute.

Lieut. ALBERT ALEXANDER ROBINSON was killed in action on July 20th in his twenty-second year. He was educated at St. Paul's School, and at the outbreak of war was training, as a Registered Student of the Institute, at University College, London. He received a commission in the Royal Garrison Artillery in November, 1914, and was gazetted as Lieutenant a few days before his death. He was awarded an Honorary War Degree of B.Sc. (Lond.) in May of this year.

Lieut. FRANCIS WILLIAM SANDERSON, a Registered Student of the Institute, was killed in action on September 1st in his twenty-fourth year. He received his general education at Haberdashers' School, and proceeded for his scientific training to Finsbury Technical College. He enlisted as a Private in the Artists Rifles, and at the time of his death was serving in the Royal Engineers.

Captain WILLIAM GILBERT SAUNDERS was killed in action on September 6th in his twenty-seventh year. He received his early education at Marlborough College, Liverpool, the Gymnasium in Bonn, and the École Supérieure de Commerce at Neuchatel. After two years' experience in the laboratories of Messrs. Ayrton, Saunders & Co., Ltd., Manufacturing Chemists, Liverpool, he took courses at the School of the Pharmaceutical Society and at Liverpool University, and passed the Examinations for the Associateship of the Institute in 1913. At the outbreak of war he was one of the Directors of Messrs. Ayrton, Saunders & Co., Ltd., of which his father is Chairman. He joined the King's (Liverpool) Regiment and at the time of his death was Adjutant of his Battalion.

Lieut. EDWARD LESLIE JOHNSON STOCKDALE, a Registered Student of the Institute, was killed in action on the Somme on July 7th in his twenty-third year. He received his general education at Elstow School, Bedford, and King's College, Ely, and his chemical training at King's College, London, taking the degree of B.Sc. with honours. On completing his training he obtained an appointment as an assistant in the laboratories of the London County Council, and at the outbreak of war received a commission in the 10th Lancashire Fusiliers, being promoted to a Lieutenancy in July, 1915.

FREDERICK WALLIS STODDART died at Bristol on April 15th in his fifty-eighth year. He was educated at Bristol Grammar School, and in 1872 became assistant to his father, Dr. William Walter Stoddart, first City Analyst for Bristol, also attending courses under Professor Letts at the University College. Later, with a view to qualifying in medicine, he proceeded to St. Thomas's Hospital Medical School, where he turned his attention more especially to chemistry and assisted Dr. Bernays from 1877 to 1880, when, on his father's death, he succeeded to the Bristol appointment, which he occupied until he resigned in 1905. He was also appointed Public Analyst for Bridgwater and Salisbury and continued a consulting practice in Bristol until his death. He was the inventor of a well-known bacteriological method for dealing with sewage and contributed many papers on sanitary chemistry to various Journals. For many years he was Lecturer in Hygienic Chemistry and Bacteriology in Bristol Medical School—now the Faculty of Medicine in the University, Bristol. He was elected a Fellow of the Institute in 1895, and served as a Member of Council from 1915 to 1916.

Second Lieut. **OLIVER JOHN STONE** died on September 22nd in his thirtieth year from wounds received in action on the Somme. He was educated at Rossall School, and received his scientific training at King's College, London, passing the Examinations for the Associateship of the Institute in 1910, and the degree of B.Sc. with first-class honours in chemistry, in 1913. He continued at the College for a time as a Student-Demonstrator, and conducted some investigations of a biological and chemical nature on antiseptic dressings for Mr. Cheate, of King's College Hospital. Later he undertook some research work with Messrs. Cross and Bevan, and was subsequently appointed chemist to Messrs. Day and Martin. Soon after the outbreak of war he enlisted in the Artists Rifles and afterwards received a commission in the Royal Field Artillery. He was elected a Fellow of the Institute in 1913.

EDWIN WHITEFIELD WHEELWRIGHT died at Malvern on May 2nd in his forty-eighth year. He received his general education at the Salt Schools, Shipley, and his training in chemistry first at the Yorkshire College, Leeds, and then at Balliol College, Oxford, where he graduated in the Honour School of Science, later proceeding to Munich, where he obtained the degree of Ph.D., having published with Professor Bamberger a research on the action of diazobenzene on acetoacetic ether. In May, 1893, he became Demonstrator at Balliol College, and in November of the same year was appointed research chemist to Messrs. Albright and Wilson, Ltd. of Oldbury, Birmingham, with whom he remained until shortly before his death. He was elected a Fellow of the Institute in 1903.

Second Lieut. **CYRIL GEORGE WILLIAMSON** was killed in action before La Boiselle on July 3rd in his twenty-third year. He was a Registered Student of the Institute, training at the University of Birmingham. At the time of his death he held a commission in the Royal Warwickshire Regiment.

FINAL EXAMINATION IN BIOLOGICAL CHEMISTRY, BACTERIOLOGY, FERMENTATION, AND ENZYME ACTION.

OCTOBER, 1916.

The examination was held from October 23rd to 27th; one Candidate presented himself. The result of the Examination will be published in Proceedings, Part I., 1917.

The following papers and exercises were set —

MONDAY, OCTOBER 23rd, 10 a.m. to 1 p.m.

1. Give an account of recent researches on protein metabolism in the animal organism.
2. Give a detailed account of the employment of micro-organisms in any industry with which you are acquainted other than brewing, distilling and vinegar-making.
3. What analytical estimations would you make for the purpose of deciding whether a given sewage effluent was suitable for discharging into a fishing stream? Give your reasons.
4. Describe in detail the steps you would take to ascertain whether given specimens of tissue contain (a) trypsin, (b) lactase, (c) lipase, and (d) peroxidase.

TUESDAY, OCTOBER 24th, 10 a.m. to 4.30 p.m.

1. Make a biological examination of the sample of Milk "A" and report upon its suitability for human consumption.
 2. Separate and identify the three organisms contained in the liquid "B."
- (These exercises will be continued to-morrow.)*

WEDNESDAY, OCTOBER 25th, 10 a.m. to 4.30 p.m.

Continue the exercises of the previous day.

1. Examine and report upon the two specimens of Takadiastase "C" and "D."
2. Estimate in the sample of Meat Extract "E" the percentages of total nitrogen and of the nitrogen existing as proteoses and peptones. Also estimate the percentages of creatin and creatinine.

(These exercises will be continued to-morrow.)

THURSDAY, OCTOBER 26th, 10 a.m. to 4.30 p.m.

Continue the exercises of the previous days.

- "F" consists of a mixture of milk, sugar and starch. Estimate the percentage of milk sugar.

(These exercises will be continued to-morrow.)

FRIDAY, OCTOBER 27th, 10 a.m. to 4.30 p.m.

Complete the previous exercises.

The Candidate was examined orally in general theoretical chemistry and was required to translate passages from French and German technical literature.

**FELLOWS, ASSOCIATES, STUDENTS AND
CANDIDATES FOR EXAMINATION WHO ARE SERV-
ING OR WHO HAVE SERVED WITH H.M. FORCES.
(SUPPLEMENTARY LIST.)**

*It is requested that any inaccuracy or omission be reported
immediately to the Registrar.*

FELLOWS.

Campbell, L. E., 2nd Lieut. 10th Battalion Royal Highlanders.
Davis, O. C. M., Lieut. R.A.M.C.
Gimingham, C. T., Lieut., General List.
Innes, A. G., Lieut. R.N.A.S.
Makin, C. J. S., Lieut., General List.
Matthews, C. P., 2nd Lieut. 3 6th Battalion East Surrey Regiment.
Paulley, W. M., 7th Battalion Durham Light Infantry (T.F.)
Price, T. S., Lieut. R.N.V.R.
Salter, C., Sergeant Malay States Volunteer Rifles.
Thompson, James, Lieut., General List.
Wilson, F. G., Captain and Gas Officer to 15th Division.

STUDENTS.

Bramer, J. D. S., Lieut. and Adjutant, 9th Battalion Royal Warwickshire
Regiment.
Day, F., Lance-Corporal R.G.A.
Hofmeyr, R., 2nd Lieut. King's Own Yorkshire Light Infantry, attached
R.F.C.
Knaggs, John, 2nd Lieut. R.E.
Somer, A. J., R.A.M.C.

Since the publication of the List given in Proceedings,
Part III., entries have been altered in the following cases:—

FELLOWS.

Bacon, G. N., 2nd Lieut. R.G.A., attached No. 3 Anti-Aircraft Section.
Bridge, S. W., Lieut., Divisional Gas Officer, Guards Division, H.Q.
Eynon, L., 2nd Lieut. R.E.
Goldsbrough, H., Lieut. R.E.
Knight, Leslie, Lieut. R.F.A. (Mentioned in despatches).

ASSOCIATE.

White, F. D., Lieut. R.E.

STUDENT.

Butler, F. H. C., Lieut. 1 4th Hants Regiment, Asst. Provost Marshal, 3rd
Division Mesopotamian E.F.
McLachlan, T., Corporal R.E. (Distinguished Conduct Medal).

The Register.

Since the publication of Proceedings, Part III., 1916, the Council have elected 9 new Fellows ; 6 Associates have been elected to the Fellowship, and 2 new Students have been admitted. The Institute has lost 9 Fellows, 2 Associates, and 7 Students by death.

New Fellows.

- Chapman, Charles Eustace, Government Analyst's Department, Adelaide, South Australia.
- Innes, Alfred George, M.A. (Oxon), Ph.D. (Zürich), Central Chemical Laboratory, H.M. Factory, Dornock, Scotland.
- Joseph, Professor Alfred Francis, A.R.C.S., D.Sc. (Lond.), 296, Willesden Lane, London, N.W.
- Lodge, Edward, 33, Scale Hill, Cowcliffe, Huddersfield.
- Moir, James, M.A., D.Sc. (Aberd.), 48, Ditton Avenue, Auckland Park, Johannesburg, South Africa ; and Government Laboratory, Johannesburg, South Africa.
- More, Andrew, A.R.C.S. (Lond.), Ellesmere, King's Road, Walton-on-Thames.
- Parker, Professor Matthew Archibald, B.Sc. (Glas.), The University, Manitoba, Winnipeg, Canada.
- Simonsen, Professor John Lionel, D.Sc. (Manc.), The Presidency College, Madras, India.
- Wilson, Forsyth James, D.Sc. (Edin.), Ph.D. (Leipzig), Royal Technical College, Glasgow.

Associates Elected to the Fellowship.

- Campbell, Laurence Eversley, B.Sc. (Lond.), Department of Agriculture, Peradeniya, Ceylon.
- Cunningham, Alexander, 15, Selly Hill Road, Bournbrook, Birmingham.
- Earl, John Campbell, Office of Government Analyst, Victoria Square, Adelaide, South Australia.

Grinling, George Noel, 61, Cartwright Garden, St. Pancras, London, W.C.
 Sproxton, Foster, B.Sc. (Lond.), The Gables, Manningtree, Essex.
 Wheatley, Robert, B.Sc. (Leeds), 63, Wentworth Road, York.

New Students.

Griffith, Percy Terence, 84, New Park Road, Streatham, London, S.W.
 Squires, Gordon Albert Upton, Biddulph House, 58, Narborough Road,
 Leicester.

DEATHS.

Fellows.

Angell, John.
 Bell, Percy Carter.
 Ferguson, John, M.A., LL.D. (Glas.).
 Gresham, Harold Edward, B.Sc. (Lond.).
 Howard, David, Past President.
 Levy, Arthur Garfield.
 McBretney, Edmund George.
 McNeill, Bedford, A.R.S.M., Assoc. M.Inst.C.E.
 Stone, Oliver John, B.Sc. (Lond.). (Died of wounds.)

Associates.

Bredin, Rev. Father James Crawford.
 Saunders, William Gilbert. (Killed in action.)

Students.

Archibald James Duncan. (Died of wounds.)
 Prince, Julius Sefton. (Killed in action.)
 Robinson, Albert Alexander. (Killed in action.)
 Sanderson, Francis William. (Killed in action.)
 Stanbury, Albert Cyril.
 Stockdale, Edward Leslie Johnson. (Killed in action.)
 Williamson, Cyril George. (Killed in action.)

General Notices.

Intermediate and Final Examinations.—The next Intermediate Examination and Final Examinations in (*a*) Mineral Chemistry, (*b*) Metallurgical Chemistry, (*c*) Physical Chemistry, (*d*) Organic Chemistry, and (*e*) The Chemistry of Food and Drugs, etc., will be held in January, 1917. Due notice of the exact dates will be sent to each Candidate.

Notice to Associates.—Associates elected prior to November, 1913, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry for at least three years since their election to the Associateship, can obtain forms of application for election to the Fellowship.

Appointments Register.—A Register of Fellows and Associates of the Institute of Chemistry who are available for appointments is kept at the Offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to communicate with the Registrar in any instance in which they are able to assist in securing appointments for qualified chemists.

The Laboratories.—The Laboratories of the Institute of Chemistry are available for the use of other Institutions for examination purposes, on terms to be obtained from the Registrar.

The Library.—The Library is open for the use of Fellows, Associates and Registered Students, between the hours of 10 A.M. and 6 P.M. on week-days (Saturdays: 10 A.M. to 2 P.M.), except when examinations are being held.

Society of Chemical Industry.—The Society of Chemical Industry has decided to publish Annual Reports of the Progress of Applied Chemistry, presenting a critical summary of the advances made in various branches of chemical industry. The first volume will be ready in December. The subjects which will be dealt with and the names of the contributors to the volume are as follows:—

Fuel—J. W. Cobb, B.Sc., F.I.C.

Gas, destructive distillation, tar products—E. V. Evans, F.I.C.

Mineral oils—A. W. Eastlake.

Dyestuffs—G. T. Morgan, D.Sc., F.R.S., F.I.C.

Fibres, paper, dyeing, printing—Julius Huebner, F.I.C.

Acids, alkalis, salts, etc.—H. A. Auden, Ph.D.

Glass, ceramics, cement, etc.—J. A. Audley, B.Sc., F.I.C.

Metals, metallurgy—W. R. E. Hodgkinson, Ph.D., F.I.C.

Electro-chemistry—J. T. Barker, Ph.D.

Fats, oils, waxes—G. H. Warburton.

Paints, pigments, varnishes, resins—R. S. Morrell, M.A., Ph.D.

Indiarubber—H. P. Stevens, M.A., Ph.D., F.I.C.

Leather, glue, etc.—J. T. Wood, F.I.C.

Sugar, starches—J. G. Macintosh.

Fermentation—A. R. Ling, F.I.C.

Sanitation, water purification—F. R. O'Shaughnessy, F.I.C.

Fine chemicals, medicinal substances, essential oils—F. L. Pyman, D.Sc., Ph.D.

Photographic materials and processes—B. V. Storr, M.Sc.

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